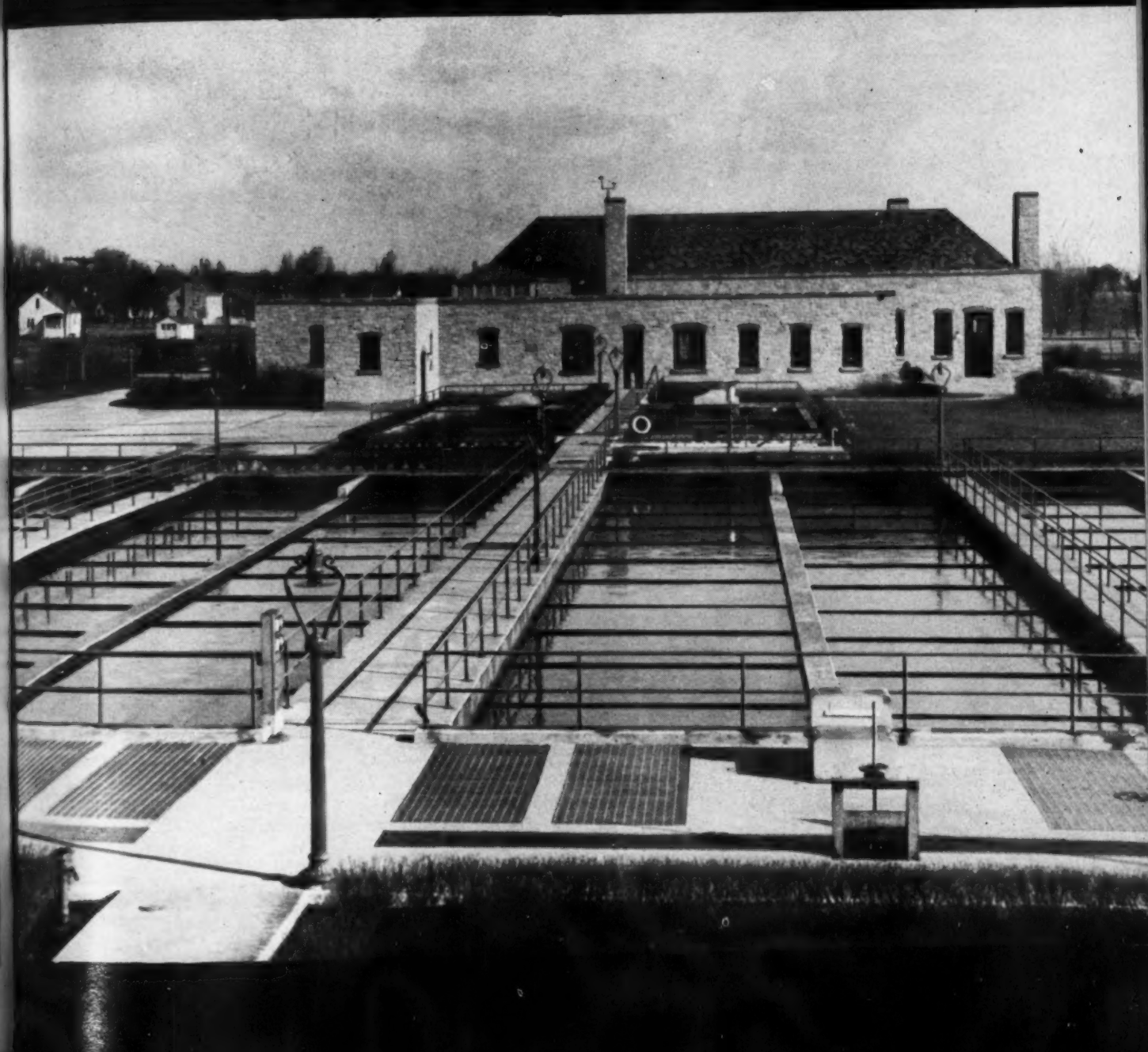
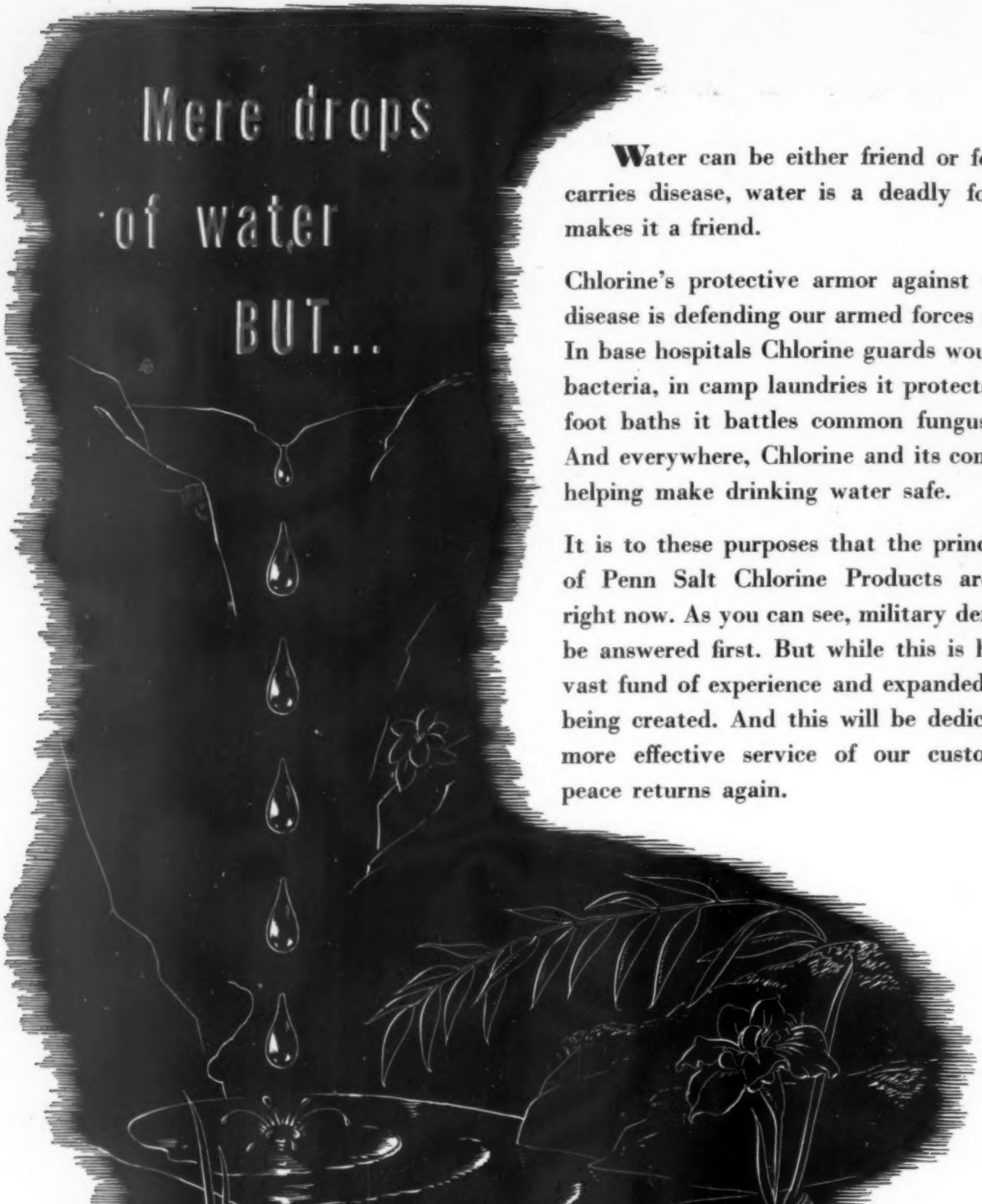
WATER WORKS & SEWERAGE





Water can be either friend or foe. When it carries disease, water is a deadly foe. Chlorine makes it a friend.

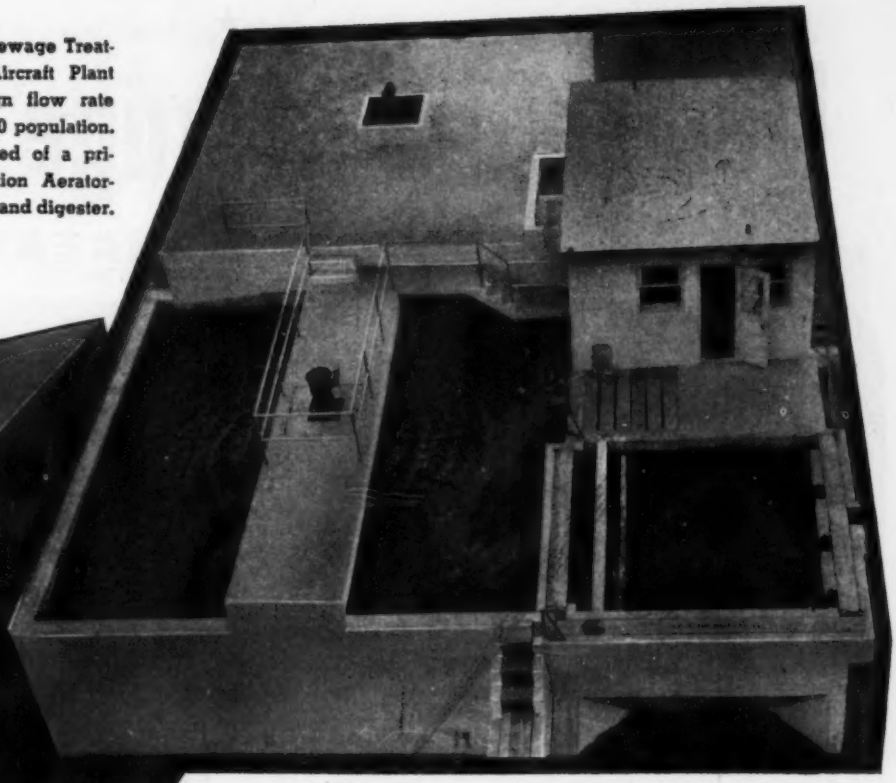
Chlorine's protective armor against water-borne disease is defending our armed forces everywhere. In base hospitals Chlorine guards wounds against bacteria, in camp laundries it protects clothes, in foot baths it battles common fungus infections. And everywhere, Chlorine and its compounds are helping make drinking water safe.

It is to these purposes that the principal output of Penn Salt Chlorine Products are dedicated right now. As you can see, military demands must be answered first. But while this is happening a vast fund of experience and expanded facilities is being created. And this will be dedicated to the more effective service of our customers when peace returns again.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals
1000 WIDENER BUILDING, PHILADELPHIA 7, PA.
New York • Chicago • St. Louis • Pittsburgh • Cincinnati • Minneapolis • Wyandotte • Tacoma

Penn Salt manufactures
LIQUID CHLORINE
for water sanitation and sewerage treatment
also
Perchloron* • Anhydrous Ammonia
Filter Alum • Ferric Chloride
Sodium Aluminate • Chloride of Lime
Caustic Soda and other products
*Trade-mark Reg. U. S. Pat. Off.

WATER WORKS & SEWERAGE, November, 1944. Volume 91, Number 11. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per pear; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.



Chicago "Package" Sewage Treatment Plant at an Aircraft Plant in the South. Design flow rate 90,000 G.P.D. for 3,000 population. The plant is composed of a primary tank, Combination Aerator-Clarifier, pump house and digester.

Simple TO OPERATE

CHICAGO "PACKAGE" SEWAGE PLANT for SMALL COMMUNITIES

Especially Developed for Populations of 100 to 3,000 . . . Not a Large Plant Scaled Down

COMPLETE SEWAGE TREATMENT AT LOWEST COST . . . NO ODORS . . . NO FLIES . . . NO UNSIGHTLY NUISANCE

Aeration and clarification within a single tank with positive, automatic sludge control. Only one simple sludge control setting, which covers a wide range of varying sewage flows and strengths. No valves to adjust for sludge control.

Local operators without previous sewage treatment experience are successfully operating more than a hundred of these plants. Some were farmers; others were coal miners, laborers, plumbers, pipefitters, salesmen and school teachers. Some of these operators also perform other municipal duties.

Operator training service by Chicago Pump Company Operating Sanitary Engineers goes with each plant.

Chicago "Package" Sewage Treatment Plants are clean, sanitary and have no objectionable odors. Visitors are amazed at the water-clear effluent. Purification is up to 98 per cent.

Ask for full description and discussion with facts and figures for this type of plant which has been especially developed for the characteristic small community sewage flow and strength.

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

2349 WOLFRAM STREET — **CHICAGO 18, ILLINOIS**

Flush-Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs, Water Seal Pumping Units, Samplers.

Swing Diffusers, Stationary Diffusers. Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

★

Free Your Sewerage Systems

FROM THESE HAZARDS

Part of 18,000-ft. line of 36-in. ARMCO Paved Invert outfall sewer across swampy ground near Newport News, Virginia, carries treated sewage.

As you plan your sewerage projects for postwar construction, remember that by using Asbestos-Bonded ARMCO Sewer Pipe you can gain these four important advantages:

1. FREEDOM from disjointing and infiltration
2. FREEDOM from continual maintenance and early replacement
3. FREEDOM to use for both severe and normal conditions
4. FREEDOM to salvage and re-use elsewhere if conditions or requirements change

Those are the freedoms or assurances that Asbestos-Bonded ARMCO Sewer Pipe gives you. They come from flexibility—the ability to give slightly under load—light weight, bolted couplings, tightly-adhering bituminous coating over galvanizing, and a thick pavement to resist wear in the bottom. Write for the ARMCO Sewer Book. ARMCO Drainage Products Association, 195 Curtis St., Middletown, Ohio.

Buy More War Bonds

ARMCO

ASBESTOS-BONDED

Armco Sewer Pipe

When considering elevated storage . . .

DON'T OVERLOOK FIRE-FLOW REQUIREMENTS

Because of the fact that most fires are of relatively short duration, elevated storage can provide water for fire extinguishment and thus avoid sudden extreme draft on the water producing system.

FIRE-FLOW requirements are one of the most important factors to consider when designing extensions or improvements to existing municipal water distribution systems. The rate at which water is required for fire extinguishment is largely determined by population, character of development (suburban or metropolitan) and fire hazards, i.e., type and congestion of the buildings. The accompanying table shows the fire-flow requirements as set forth by the N.B.F.U. for average cities up to 200,000 population.

Population	Required Fire-Flow For Average City—gpm	Hours Duration
1,000	1,000	4
1,500	1,250	5
2,000	1,500	6
3,000	1,750	7
4,000	2,000	8
5,000	2,250	9
6,000	2,500	10
10,000	3,000	10
13,000	3,500	10
17,000	4,000	10
22,000	4,500	10
28,000	5,000	10
40,000	6,000	10
60,000	7,000	10
80,000	8,000	10
100,000	9,000	10
125,000	10,000	10
150,000	11,000	10
200,000	12,000	10

In communities of 200,000 or less the water required for extinguishing potential fires is usually greater than the average daily water requirement for ordinary use. Many engineers recommend that provision be made for fire demand, plus 150% of the daily average ordinary demand.

LOCATION OF ELEVATED STORAGE

It is customary to locate elevated storage in the section of heaviest demand, either domestic or fire. Locating an elevated tank at the extreme edge or beyond the limits of the distribution system is considered poor practice. This is especially true when there are several tanks in the system. Shallow-depth tanks should be located near the center of heavy demand sections of a distribution system in order to be contributing factors to fire-flow.

250,000-gal. Horton Elevated Tank at Marysville, Michigan

Horton elevated storage can provide a municipality with many advantages such as more uniform pressures, avoidance of high electric peak-demand charges, protection against power outages and more efficient operation of pumping equipment. When considering improvements or additions to your distribution system, consult a hydraulic engineer and write our nearest office outlining your needs. Ask for reprint entitled "The Distribution System—Some Basic Considerations in Its Design, Maintenance and Operation."

CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Havana.....402 Edificio Abreu
Birmingham 1.....1586 North 50th Street
Plants in Birmingham, Chicago and Greenville, Pennsylvania

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Drive
Philadelphia 3.....1644-1700 Walnut Street
Washington 4.....930 F Street N.W.
San Francisco 5.....1063 Rialto Bldg.
In Canada: Horton Steel Works, Limited, Fort Erie, Ont.

LOUIS XIV OF FRANCE SELECTS ROUTE FOR WORLD'S FIRST CAST IRON WATER MAIN.

280 YEARS OF CONTINUOUS SERVICE IN EUROPE

THE first recorded installation of cast iron pipe to carry water was made in 1664 by order of the King of France. Unless recently destroyed by bombing, it is still in service. Throughout Europe 200-year-old cast iron water mains were in service before the United States and Royal Air Force bombers began their destructive raids—and still may be.

So when you specify cast iron pipe for current or postwar construction, you know one thing for certain—it will serve for centuries, in its original location or elsewhere. If the line has to be relocated or abandoned or replaced by larger diameters, you also know that cast iron pipe can be taken up and re-laid, or salvaged for cash. You may also know that cast iron pipe costs far less to maintain than any other pipe used for water mains, as proved by an unbiased survey.

[Section of world's oldest cast iron water main still (at last reports) supplying the town and parks of Versailles, France, after 280 years of continuous service.]

123 YEARS OF CONTINUOUS SERVICE IN AMERICA

PRESIDENT MONROE SIGNING MESSAGE TO CONGRESS DECLARING THE MONROE DOCTRINE IN 1823.

[Here is America's oldest cast iron water main, now in its 124th year of continuous service in the water distribution system of the city of Philadelphia.]

THE first cast iron water main installed in America was laid in 1821 in Philadelphia. It is still in service. Today, nearly a century-and-a-quarter later, the methods by which cast iron pipe is produced have undergone revolutionary changes. Metallurgical, laboratory and production controls have been developed. Extensive product and field research projects have been carried out by our Association, independently and in cooperation with Associations representing users of pipe. A recent and fundamental forward step is the new Law of Design for cast iron pipe in underground service, approved by the American Standards Association and sponsored by official organizations representing pipe users.

Thus, you can take it for granted that the cast iron pipe made today by our members, has not only *long life* as proved by generations of service the world over, but is more economical than ever.

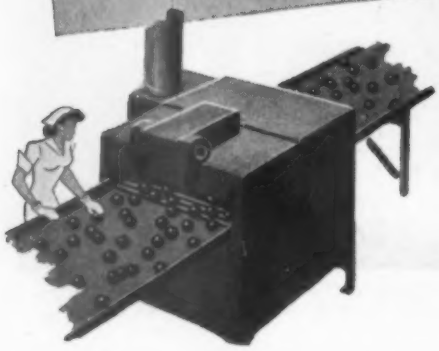
Cast Iron Pipe Research Association
Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago, Ill.

THE FARMER KNOWS US
as makers of Bean Orchard and Crop Sprayers, Niagara Insecticides, Dusting Machines, Peerless Pumps and other equipment for growing & harvesting.

THE FIGHTING FORCES KNOW US
as creators*, designers and builders of "Water Buffalo" amphibians and other equipment for the armed forces.
*In cooperation with the Bureau of Ships, U.S. Navy.

FOOD PACKERS KNOW US
as the creators and builders of equipment for processing, canning and packing nearly every type of food, including over 70% of the nation's evaporated milk.

THE FIREMAN KNOWS US
as the originators and builders of FMC Original Fog Fire Fighters, revolutionary equipment which produces a dense fog for extinguishing fires almost instantly.



PRODUCE AND FRUIT GROWERS,
Shippers, Dealers and Retailers know us as developers and producers of protective processes, such as Hypo-Cler Sterilizing Bath and Flavorseal Protection, that prolong the fresh life of fruits and vegetables.

WHO IS Food Machinery Corporation?

Food Machinery Corporation is many things to many people. Ten manufacturing divisions with fourteen major factories located from coast to coast make hundreds of different products in diversified fields. But *all* FMC equipment is known alike for its excellence of design, its superior engineering and mechanical stability. At the root of this reputation is an exceptional "know-how" that is the result of more than sixty years of building specialized equipment and of solving difficult engineering problems for the food industry.

CITY ENGINEERS KNOW US
as the designers and manufacturers of Peerless Pumps—Turbine, Hi-Lift and Hydro-Foil—supplying water for city systems, and industrial and farm uses.

Write on your business letterhead for a free copy of the full-color booklet "Amphibian Diary," telling the story of the FMC "Water Buffalo."

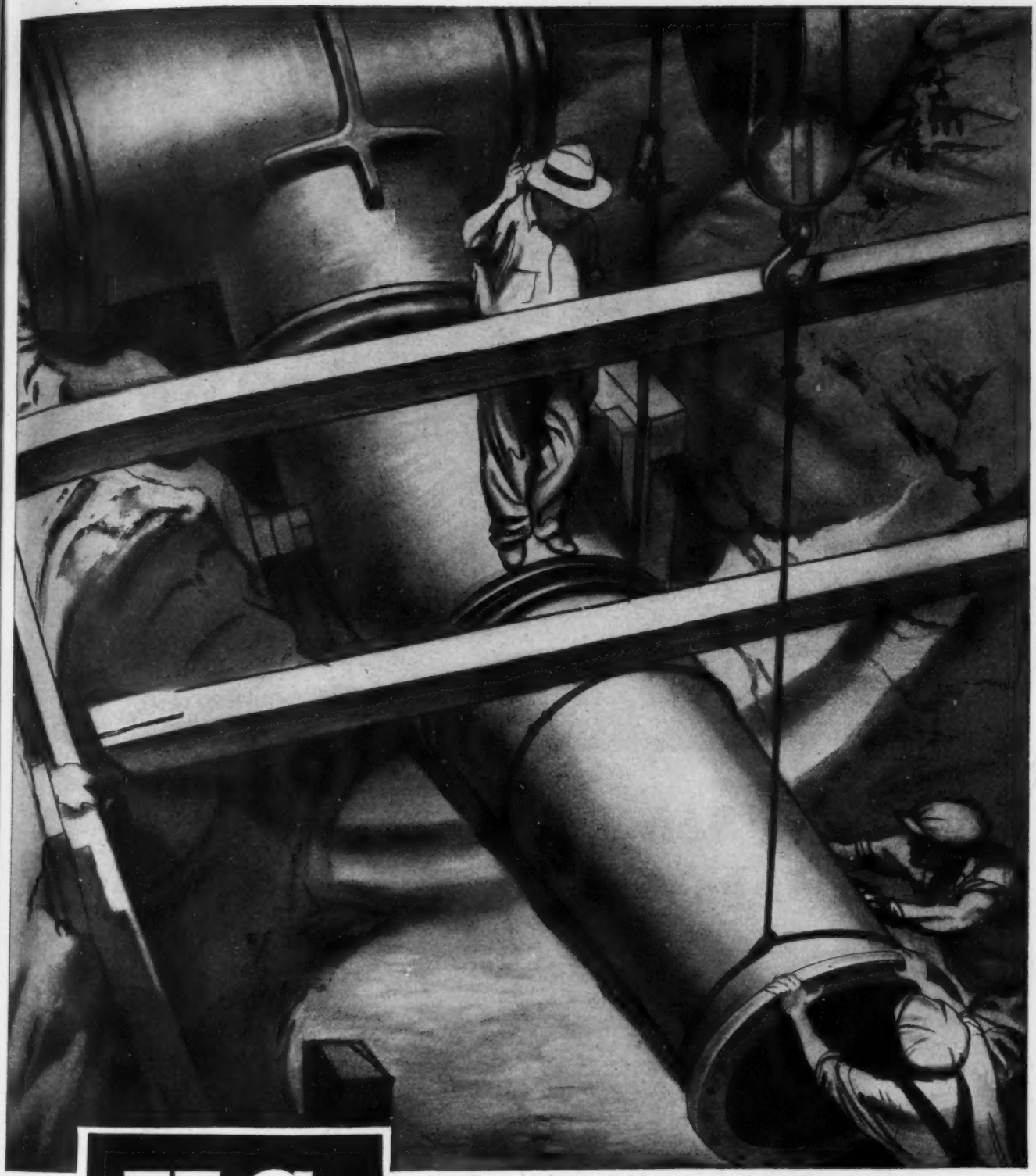
FOOD MACHINERY CORPORATION
EXECUTIVE OFFICES: SAN JOSE, CALIFORNIA

ARMY-NAVY E
LAKELAND
RIVERSIDE
HOOPESTON
LOS ANGELES

MANUFACTURING DIVISIONS:

NIAGARA SPRAYER & CHEMICAL COMPANY, INC., MIDDLEPORT, NEW YORK
SPRAGUE-SELLS DIVISION, HOOPESTON, ILLINOIS
ANDERSON-BARNGROVER AND BEAN-CUTLER DIVISIONS, SAN JOSE, CALIF.
PEERLESS PUMP DIVISION, LOS ANGELES & FRESNO, CALIF.; CANTON, OHIO
JOHN BEAN MANUFACTURING COMPANY, LANSING, MICHIGAN
FOOD MACHINERY CORPORATION
RIVERSIDE, CALIF.; DUNEDIN & LAKELAND, FLORIDA; HARLINGEN, TEXAS

BUY BONDS TO HELP WIN THE WAR... TO PREVENT DICTATORSHIP FROM INVADING OUR SHORES... TO KEEP SAFE OUR CONSTITUTIONAL FORM OF GOVERNMENT AND OUR BILL OF RIGHTS



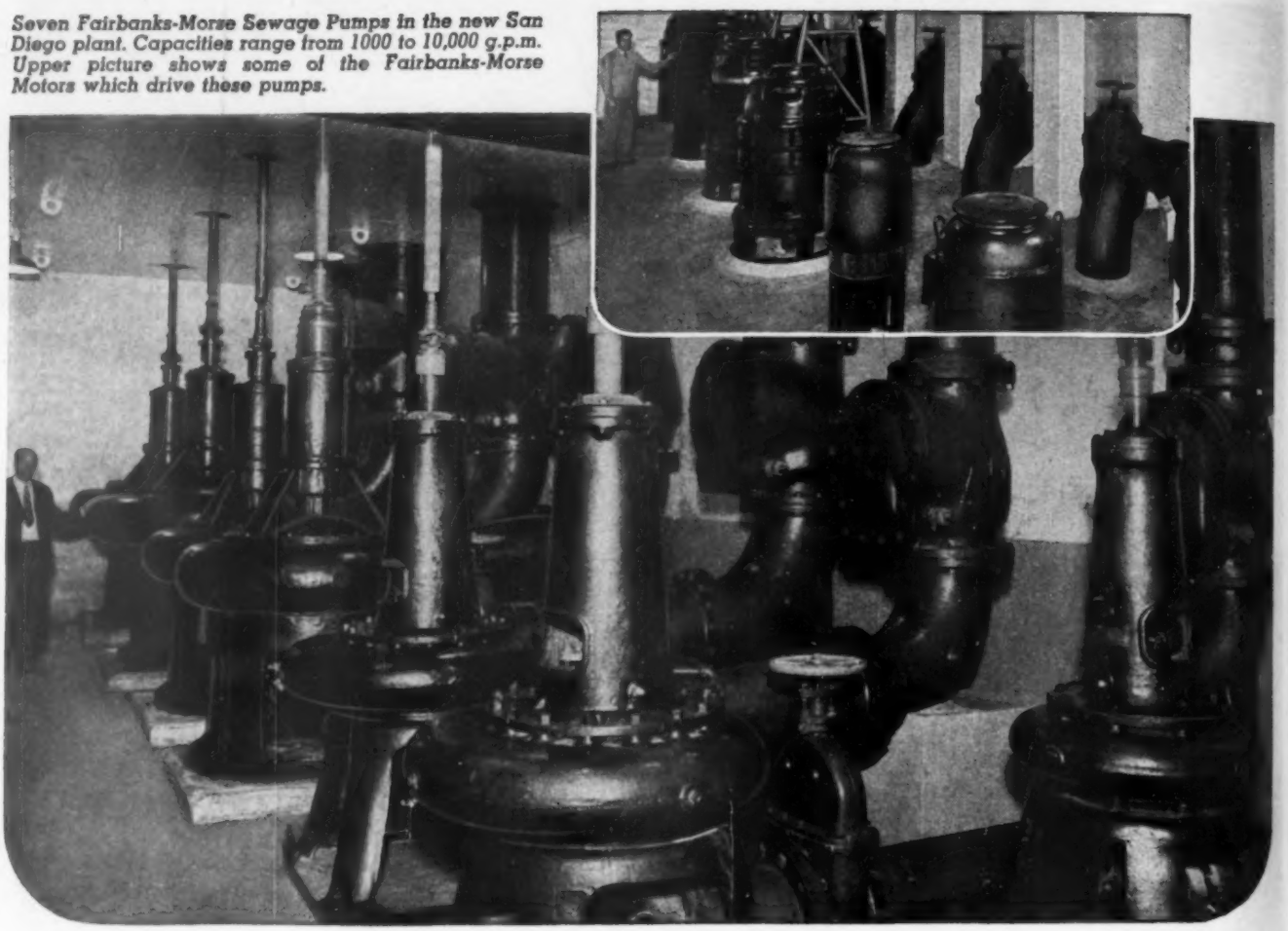
Large diameter fittings installed for pumping station.
Drawn by Rico Lebrun for U. S. Pipe & Foundry Co.

U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
Plants and Sales Offices throughout the U. S. A.

If you have a problem in connection with the design of special fittings or castings we can help you. One plant specializing in the manufacture of fittings—special castings foundries at our other plants—a competent technical staff—and 44 years of experience—are at your service. Our equipment for casting and completely machining special castings in large sizes is exceptional and extensive.

Seven Fairbanks-Morse Sewage Pumps in the new San Diego plant. Capacities range from 1000 to 10,000 g.p.m. Upper picture shows some of the Fairbanks-Morse Motors which drive these pumps.



New San Diego Plant Uses Fairbanks-Morse Sewage Pumps

The San Diego, California sewage treatment plant, put into operation in July, 1943, was designed with a generous reserve capacity. But wartime conditions so quickly swelled the city's population, that already the plant has operated many times at near capacity.

Thus the new plant promptly demonstrated its ability to handle heavy loads. It has demonstrated its operating economy, too . . . the first 2,024 million gallons of sewage were treated for only $14.75 per million gallons. Sales of fertilizer produced—$120 worth per day—pay a considerable part of the operating cost.

Contributing to the efficiency and economy of the San Diego plant are seven Fairbanks-Morse Sewage Pumps, each driven by a Fairbanks-Morse Motor.

There are efficient Fairbanks-Morse Pumps for *every* municipal need, whether for sewage handling or for water supply. Let our pump engineers help solve your pumping problems without cost or obligation. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

BUY MORE WAR BONDS

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Pumps

Diamond Liquid Chlorine

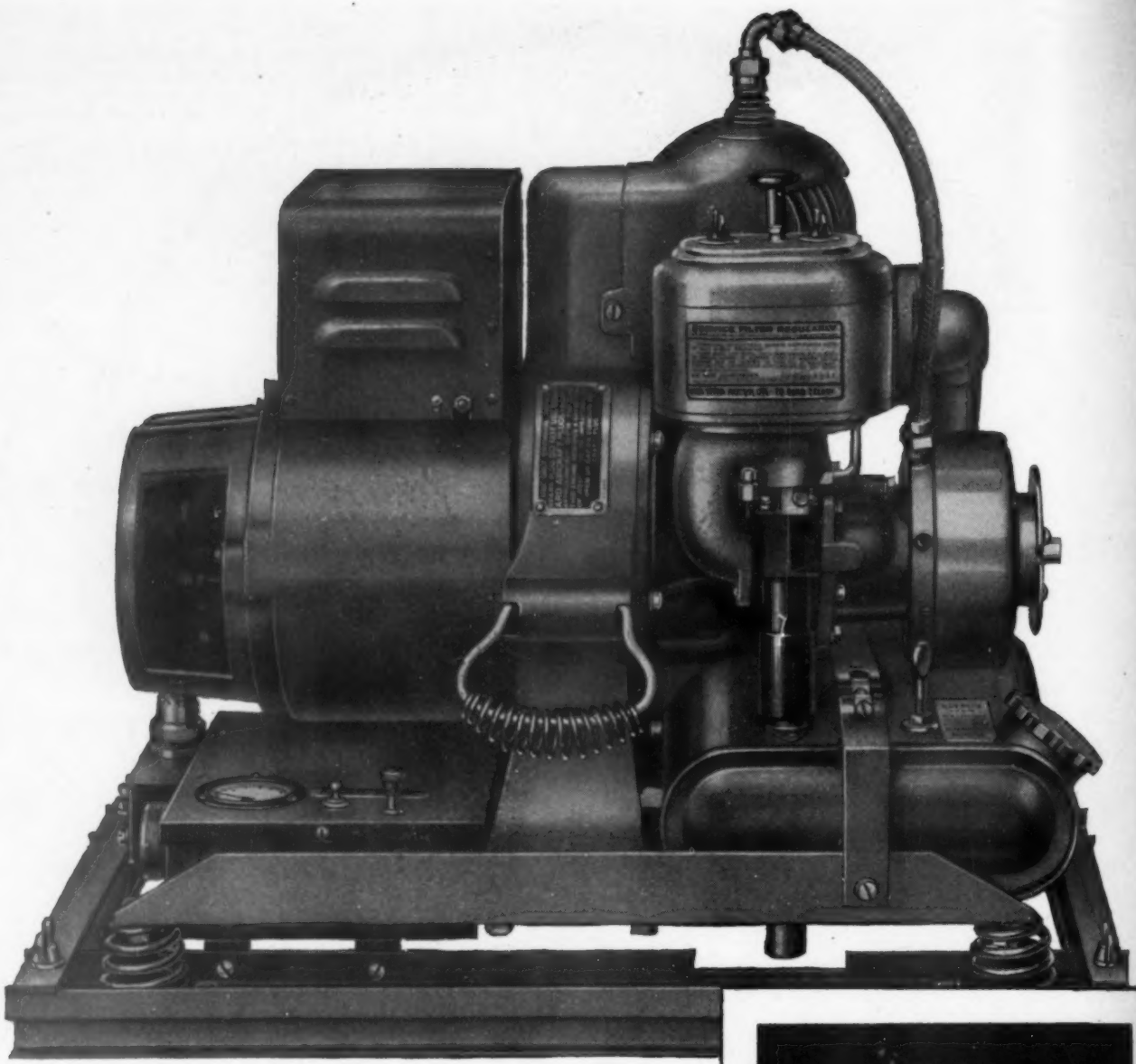
is always uniform and free from unwanted impurities

Whether you buy by the carload or in individual cylinders, Diamond Liquid Chlorine is always dependable in purity and uniformity. A very important part of our manufacturing process is the rigid control over quality maintained at every processing step.

Specify DIAMOND to insure the quality of your Liquid Chlorine.

Consult Diamond Technical Service for Greater Efficiency in Using Liquid Chlorine!

DIAMOND ALKALI CO.
PITTSBURGH 22, PA.
AND EVERYWHERE



It has to work alone and like it

No and's, if's or but's about it, a Homelite Portable Generator, installed in a plane or a tank is in no position to receive nurse-maid attention. It's usually crammed into some hot, tight corner where it is practically impossible to service it.

Which means just one thing . . . a Homelite Generator with its built-in gasoline engine has to work and stand up under the toughest kind of usage . . . hours on end . . . without receiving any attention or service. To meet demands like this . . . born of war . . . Homelite engineers have developed a higher powered, lighter-weight and, above all, a more dependable gasoline-engine-driven generator . . . a compact, portable Homelite that will meet and pass the performance requirements of any peace-time job.

HOMELITE CORPORATION
PORT CHESTER, NEW YORK

FOR YOUR PEACE-TIME JOBS

The new Homelite Portable Generators that you will use after the war for operating brilliant floodlights or electric tools will work better in winter and summer. They will be more dependable even under the toughest operating conditions. They will work longer hours without attention or service . . . and will be more rugged and powerful than ever before.

Portable Pumps - Generators - Blowers

Keep Your Eye on the Ball

In order to deliver continuously a safe, pure and palatable water, the waterworks official must always "keep his eye on the ball".

His opponent is Mother Nature, who is forever trying to put over a trick play, such as dumping leaves into the water supply, growing algae at embarrassing moments, or causing odor and color by decomposing vegetation.

The waterworks official must therefore prepare his defenses well in advance so that Mother Nature doesn't take him for an "end-run".

Objectionable elements in your water strike when you least expect them. Be ready to tackle bad taste and odor on a moment's notice! Get your supply of Aqua Nuchar Activated Carbon NOW, and you will cut down consumer complaints later!

BLUEPRINT NOW!

But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE	35 E. WACKER DRIVE	748 PUBLIC LEDGER BLDG.	844 LEADER BLDG.
NEW YORK 17, N.Y.	CHICAGO 1, ILLINOIS	PHILADELPHIA 6, PA.	CLEVELAND 14, OHIO

IMPORTANT

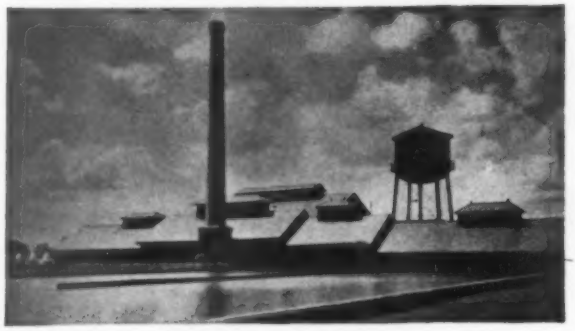
Public Health must be maintained!

The necessity of maintaining public health in war time is self-evident. Municipal officers in charge of water purification and sewage disposal have a vital responsibility in guarding the nation's health which should not be underestimated as a contributing factor to final victory.

However, the problems of maintaining public health are *becoming increasingly difficult in the face of material shortages and transportation handicaps.* General's "Alum" will help do the job right. But to ease the situation in regard to *Aluminum Sulfate* as much as possible, won't you place your orders as far ahead as you can so that we may schedule our production on an efficient basis.

Why Most American Cities Prefer General Chemical Aluminum Sulfate

General Chemical Aluminum Sulfate is an especially developed "Alum." High quality and constant uniformity have given it a *time-tested* reputation among water works engineers and sewage plant operators, who know its reliability through experience.



★ FOR WATER WORKS

1. Makes water crystal clear.
2. Longer filter runs are obtainable.
3. Is economical, used properly will conserve chlorine supplies . . . because it does not require oxidation to make it effective.
4. Superior in tests against other coagulants.
5. High in quality, its constant uniformity can be counted upon.

★ FOR SEWAGE PLANTS

1. Clean, easy to handle and economical to use.
2. Simple application, requires only low cost feeding apparatus and minimum attention.
3. Clear, colorless effluents are possible.
4. Precipitated sludge digests readily.
5. Treated digested sludge dries quickly, without odor.

GENERAL CHEMICAL COMPANY

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

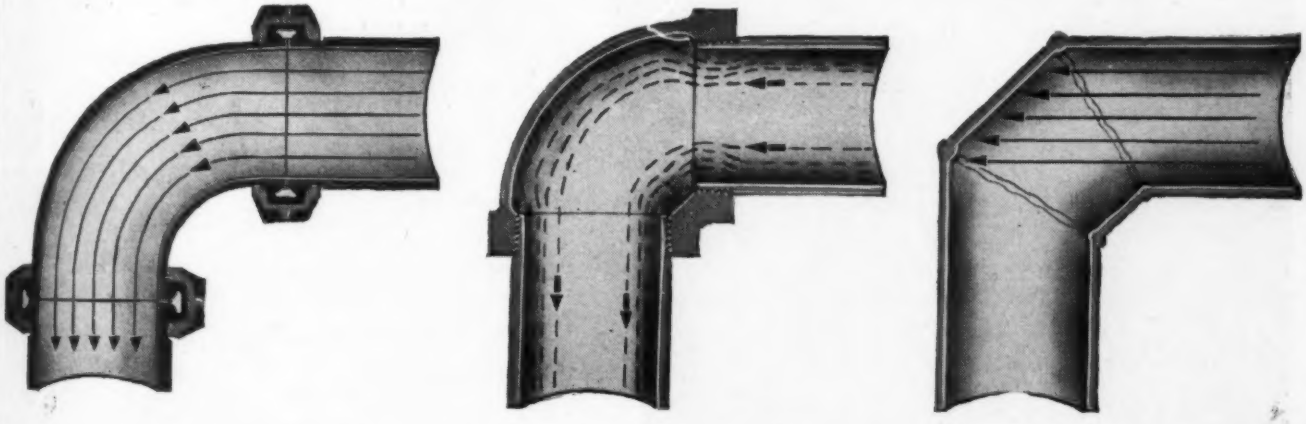
Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Co., Ltd. • Montreal • Toronto • Vancouver

Pumping costs high?...

Install Victaulic Full Flow Pipe Fittings!



MORE EFFICIENT FLOW...REDUCED FRICTIONAL LOSSES

INCREASED EFFICIENCY

WAR BONDS — A PIPE LINE FROM YOU TO WIN

You can see the engineering difference! At your left on the flow diagram above . . . note the long radii, the wide smooth sweeps of Victaulic. Walls are smooth, true-circular with no internal projections, no pockets. Because they can be swiveled and set at any angle through 360 degrees, they act in effect as swing joints. You can remove them from the line without disturbing balance of the system.

For increased pipeline delivery, greater efficiency and economy, install Victaulic Full Flow Pipe Fittings...the companion line of the Victaulic Coupling, fastest known way to couple pipe. VICTAULIC COMPANY OF AMERICA, 30 Rockefeller Plaza, New York 20, N. Y.; Victaulic Inc., 727 West 7th Street, Los Angeles 14, California; Victaulic Co. of Canada, Ltd., 200 Bay Street, Toronto.

VICTAULIC

[Reg. U. S. Pat. Off.

SELF-ALIGNING PIPE COUPLINGS AND FULL-FLOW FITTINGS

Copyright 1944 by Victaulic Co. of America

OIL MINING MARINE MUNICIPAL INDUSTRIAL

TYPE "MS" METER REGISTERS
SEWAGE AIR
"S" FLOW CONTROLLERS
SAND EXPANSION INDICATORS
VERTICAL "S" CONTROLLERS
PRIMARY DEVICES
AIR INLET VALVES
THIS PART OF YOUR BLUEPRINT IS AVAILABLE
NOW
FROM SIMPLEX
Set your post war plans in action now—replace or add to your present plant equipment with time proven Simplex Water and Sewerage Equipment. If you are planning to build a new plant, write "Simplex" into the specifications and be sure of top performance and low maintenance.
SIMPLEX VALVE & METER COMPANY
6743 UPLAND STREET, PHILADELPHIA 42, PA.

ENGINEERING DATA

GRAVITY TYPE

Sizes: Class 1— 4" to 36" Class 3—10" to 36"
Class 2—10" to 36" Class 4—18" to 36"

Crushing Strengths:
A.S.T.M. 3-edge bearing test method
Lb. per linear ft.

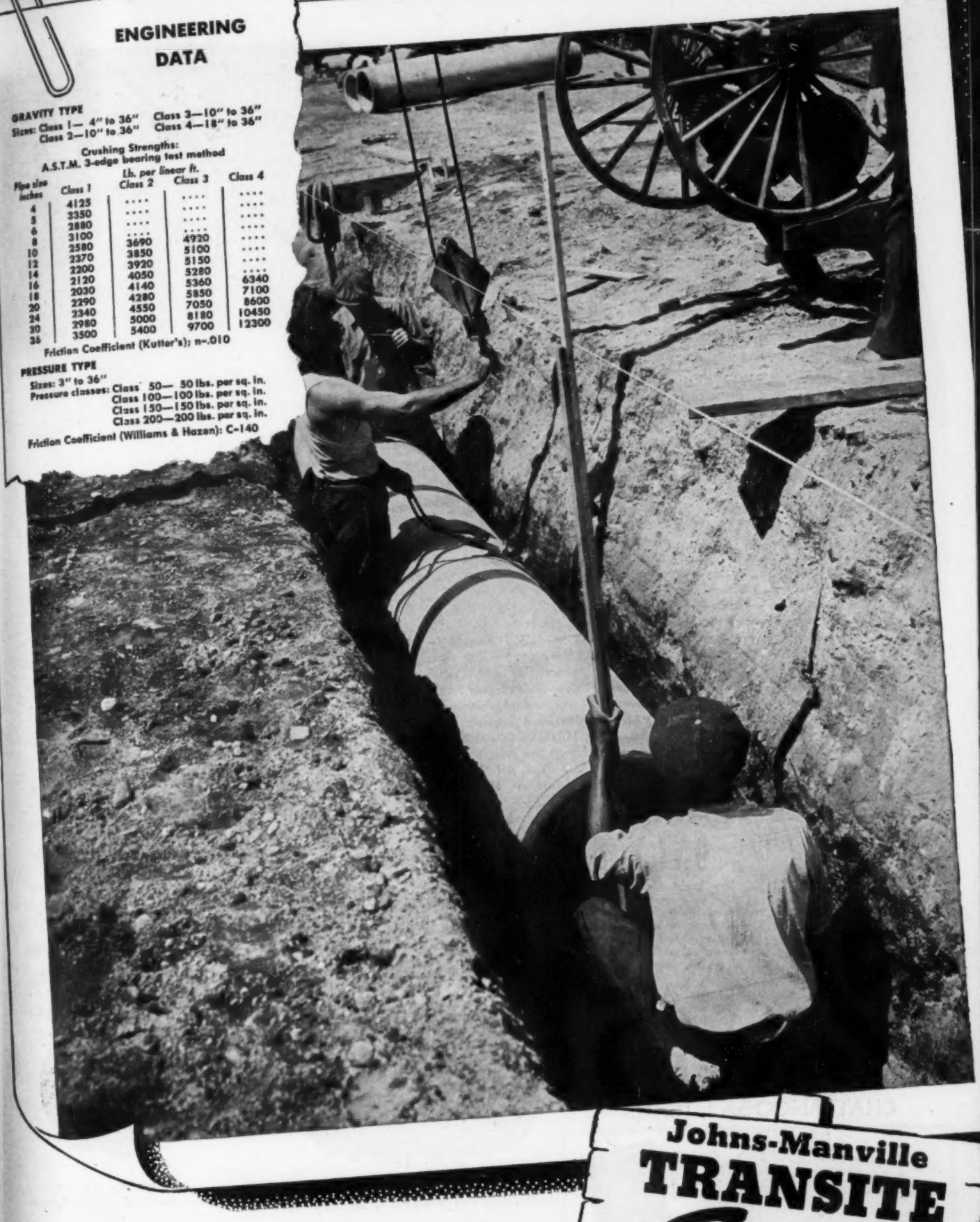
Pipe size inches	Class 1	Class 2	Class 3	Class 4
4	4125	....	....	....
5	3350	....	....	....
6	2880	....	....	....
8	3100	....	4920	....
10	2580	3690	5100	....
12	2370	3850	5150	....
14	2200	3920	5280	....
16	2120	4050	5360	6340
18	2030	4140	5850	7100
20	2290	4280	7050	8600
24	2340	4550	8180	10450
30	2980	5000	9700	12300
36	3500	5400		

Friction Coefficient (Kutter's): n=.010

PRESSURE TYPE

Sizes: 3" to 36"
Pressure classes: Class 50— 50 lbs. per sq. in.
Class 100—100 lbs. per sq. in.
Class 150—150 lbs. per sq. in.
Class 200—200 lbs. per sq. in.

Friction Coefficient (Williams & Hazen): C=140



Johns-Manville
TRANSITE SEWER PIPE
An Asbestos Product

TRANSITE SEWER PIPE PROVIDES THESE IMPORTANT ADVANTAGES

Fast Installation . . . High Strength . . . Less Infiltration . . . High Carrying Capacity

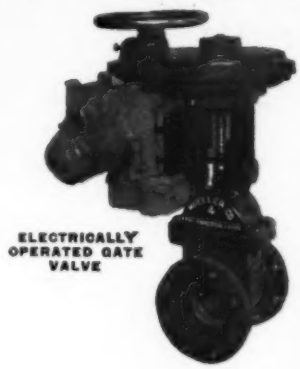
Complete information is given in brochure TR-21A. And for details on Transite Pressure Pipe for force mains and for water lines, send for Transite Pressure Pipe Brochure

MUELLER-COLUMBIAN • THE ACCEPTED STANDARD

WHAT KIND OF GATE VALVE DO YOU NEED?

O. S. & Y. SPUR GEARED VALVE WITH BY-PASS

The many purposes for which gate valves are used require many types of valves. No matter what your needs may be MUELLER-COLUMBIAN can supply them. The husky little four-incher shown at right center may be electrically operated by remote control. The big 36" gate valve shown in panel is an outside stem and yoke type equipped for hand operation. The by-pass shown can be had on all the larger sizes. Size does not stop us, either. See the 48" giant pictured below. For those tough jobs where throttling is required or where installation in a vertical pipe is necessary, the square bottom type shown at lower right is ideal. Special shoes and guides prevent tilting of the discs and damage to the seat and disc rings. This big fellow is hydraulically operated . . . We can furnish any valve you need from our three quality lines. Our A.W.W.A. line of high pressure valves meets all A.W.W.A. specifications. For spots where pressures are lower and less strength in design is needed, our Low Pressure line is complete. For industrial uses our Underwriters line meets every specification of Underwriters Laboratories and Associated Factory Mutual . . . Every valve is made of close-grained gray iron castings accurately machined and assembled. All working parts are of bronze. Each valve is tested to twice the indicated working pressure. Opens easily — closes easily. Hundreds of MUELLER-COLUMBIAN gate valves buried underground are mute testimony to the long life and low upkeep record maintained by these valves . . . Yes, sir! We carry in stock or can build to your specifications any kind of valve you need. Write us today for full details.



ELECTRICALLY OPERATED GATE VALVE

ONLY SIX PARTS

GATE ASSEMBLY (OPENED)

The heart of every MUELLER-COLUMBIAN valve is the gate assembly with its famous 4-point wedging mechanism. Entire assembly comes out as a unit. Nothing to lose. Simple in construction. Positive in action. No sprung or warped discs. No damaged seat rings. No leaks . . . Demand it!

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BUY MORE WAR BONDS!

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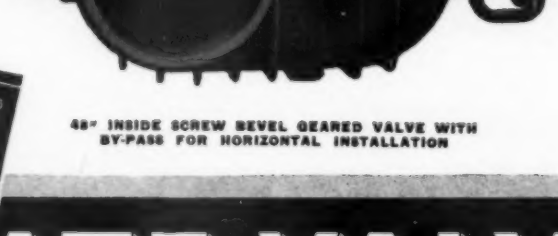
SQUARE BOTTOM HYDRAULICALLY OPERATED GATE VALVE



48" INSIDE SCREW BEVEL GEARED VALVE WITH BY-PASS FOR HORIZONTAL INSTALLATION

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Mueller Columbian GATE VALVES

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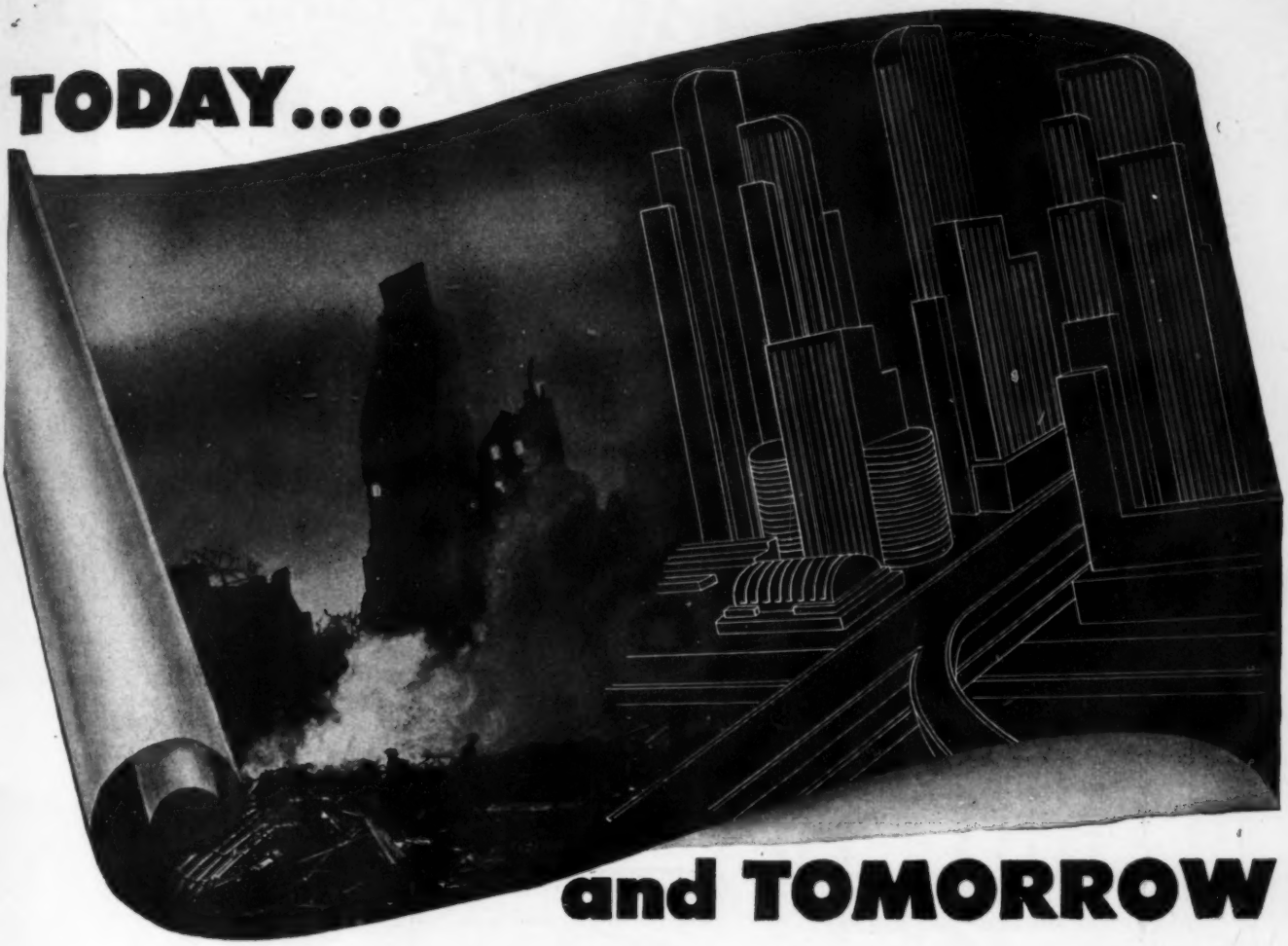

and TOMORROW

● Now's the time to make plans for your pipelines of tomorrow . . . and to get down in black and white all those war-deferred municipal improvements and extensions which can be started immediately after the war.

In planning water supply lines, it's the duty of every responsible official to build the sturdiest pressure lines possible. And, the one sure way to do that is to specify Lock Joint Reinforced Concrete Pressure Pipe. For many years, Lock Joint Pipe has been checked and double-checked, proven again and again, even under the most difficult conditions, a safe and sound investment. When installing Reinforced Concrete Pressure Pipelines, here's the performance you can depend upon: LOW FIRST COST . . . LONG LIFE . . . HIGH CAPACITY . . . LOW MAINTENANCE . . . GREAT STRENGTH . . . WATER TIGHTNESS . . . SAFETY.

The extensive use of Lock Joint Concrete Pressure Pipe for important mains in principal cities throughout the country and the constantly growing number of repeat orders is abundant proof of the quality of these tailor-made pipelines.

◆ ◆ ◆ ◆

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LOCK JOINT PIPE COMPANY

Established 1905

AMPERE, NEW JERSEY

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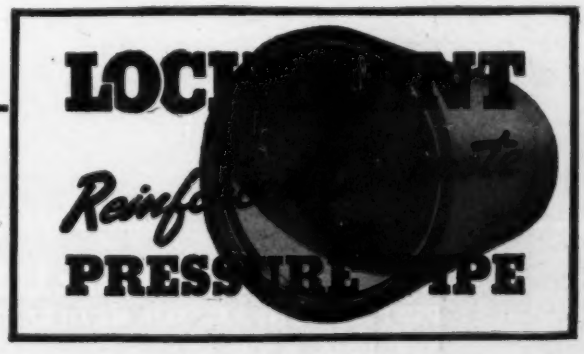
SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Mains as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*



FOR PROMPT POSTWAR ACTION

ON YOUR WATERWORKS IMPROVEMENT PROJECT . .

Blueprint Now!

No better time than now to put your plans on paper—ready to build with *ahead of the field* when the postwar scramble begins. Today's completed plans may require future minor changes—but it's easier to alter detail then, than to start from scratch when the rush is on!

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LAYING CAST-IRON BELL & SPIGOT MAINS

IN ANY TEMPERATURE RANGE, INCLUDING SUB-ZERO

THIS *DIFFERENT* JOINTING COMPOUND WILL SPEED THE JOB!

TEMPERATURES from Zero to −36° are all in the day's work for *Tegul*-MINERALEAD. It handles, melts and pours easily, regardless of the thermometer's ups and downs. Snow, and floods that come with sudden thaws, won't harm *Tegul*-MINERALEAD stored unprotected on the job. The ingot form makes it immune to wetting, even when submerged.

Your workmen will find it easy to ship, store and work with. They'll appreciate its freedom from physical separation which sometimes spoils jointing compound in other forms. For no amount of jolting in transit from factory to job can change the correct composition of *Tegul*-MINERALEAD.

Tegul-MINERALEAD is *uniform, three times more elastic* than any other sulphur base compound, has *twice the resistance to mechanical shock* and is *twenty times more resistant to thermal shock*—sudden temperature changes.

By every consideration of facility in use and long range economy in laying and maintenance, you should look into *Tegul*-MINERALEAD for that next Bell & Spigot Water Line job. For informative literature, write our head office here at Mertztown. You can reach an ATLAS field representative at the nearest branch office listed below.

Tegul-MINERALEAD comes in ten pound ingots, easy to handle and economical on shipping and storage space. This form insures correct composition being maintained from our plant to your job. The ingot is readily broken with hammer and fresh supplies may be added to the melting pot without stalling the work. With *Tegul*-MINERALEAD you need no skilled labor, caulking or deep bell holes.

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of Mertztown Penna.
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Tegul-MINERALEAD

View of the "Constellation" at 1:54 P.M. (E.W.T.), April 17, 1944, as it landed on the Washington National Airport after leaving Burbank, California, at 3:56 A.M. (P.W.T.) the same day. This ultra-modern plane has a wing span of 123 ft., overall length 95 ft., and a gross weight of more than 80,000 lbs. The cruising speed is more than 300 miles an hour at 19,000 ft. altitude, and the landing speed is less than 80 miles an hour. The plane has four independent fuel systems. (*Photo by Del Ankers.*)

CONCRETE PIPE LINES DRAIN THE NATION'S MAJOR AIRPORTS

When the TWA's 57-passenger Lockheed "Constellation" arrived at the Washington National Airport, Washington, D. C., April 17, 1944, after a record flight of 2,400 miles from Burbank, California, in 6 hours 57 minutes, it landed on runways safely designed and drained with concrete pipe. More than 64,000 ft. of concrete sewer pipe and reinforced concrete sewer and culvert pipe was required to build drains parallel to and under runways of the Washington National Airport.

Concrete pipe and reinforced concrete pipe ranging in diameter from 6 to 108 in. has been required to build drains, culverts, and sewers for most major airports of this country because of these advantages:

1. Maximum strength when properly bedded and back-filled;

2. Maximum hydraulic capacity;

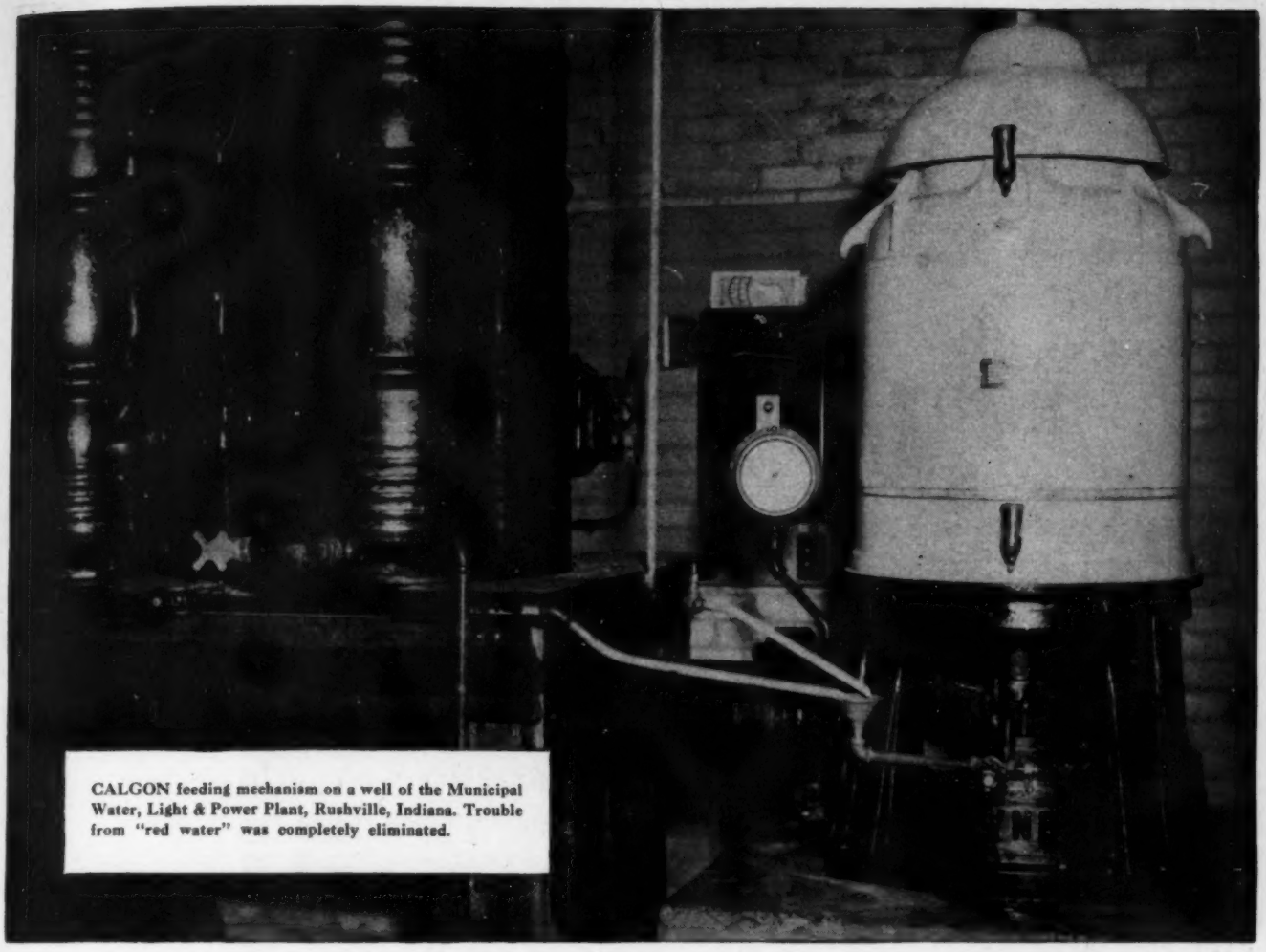
3. Long life expectancy;

4. Furnished locally at reasonable cost by our members. List mailed on request.

When you design drainage systems for airports now and in the postwar period, specify concrete pipe complying with the tests and other provisions of the Standard Specifications of the American Society for Testing Materials and the American Association of State Highway Officials.

AMERICAN CONCRETE PIPE ASSOCIATION

33 West Grand Avenue, Chicago 10, Illinois • 342 Munsey Building, Washington 4, D. C.



CALGON feeding mechanism on a well of the Municipal Water, Light & Power Plant, Rushville, Indiana. Trouble from "red water" was completely eliminated.

"Red Water" complaints stop when Calgon Treatment starts

DUE to the presence of 1.6 ppm. of iron in the well water, complaints of "red water" were numerous at Rushville, Indiana. They were accepted as normal and this condition as something to be endured by officials and customers alike until such time as an iron-removal plant could be installed.

But then they heard about Calgon and its action in stabilizing dissolved iron in well water, and thus preventing such troubles with "red water" and iron stains.

In July, 1943, Mr. D. A. Long, Superintendent, started Calgon Treatment with a feed of 3.2 ppm. Results were immediate and extremely satisfactory. Complaints stopped and none have been received in the fifteen months since the use of Calgon was begun.

Calgon Treatment is safe, simple, and economical. For instance, the cost at Rushville is $4.00 per million gallons.

Calgon Treatment is equally successful in preventing "red water" from corrosion or in stopping deposition of calcium carbonate scale. The treatment is similar. From 0.5 to 2.0 ppm. Calgon stops scale and from 0.5 to 10 ppm. controls corrosion at all pH values above 5.0.

Hundreds of other cities have solved their "red water" and scale problems by this simple treatment. Why don't you write for complete information?

Calgon solves 4 water works problems

1. **Prevention of scale** from hard, high-bicarbonate waters. Calgon, added at the plant, prevents scale formation in mains, meters and hot-water heaters, throughout the system.

2. **Corrosion control**—Calgon forms a thin protective film on metals and metal oxides at pH values of 5.0 and higher. This reduces the attack of oxygen to such an extent that corrosion ceases to be a problem.

3. **Prevention of "red water"**—Calgon prevents the precipitation of dissolved iron. Thus "red water," either from iron initially present in well water, or from corrosion, can be eliminated.

4. **Stabilization of water** following lime or lime-soda softening. Calgon's ability to prevent precipitation of calcium carbonate stabilizes water to the ends of the system.

*Calgon is the registered trade-mark of Calgon, Inc., for its glassy sodium phosphate products.

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HALL
BUROMIN
CALGON

calgon, inc.

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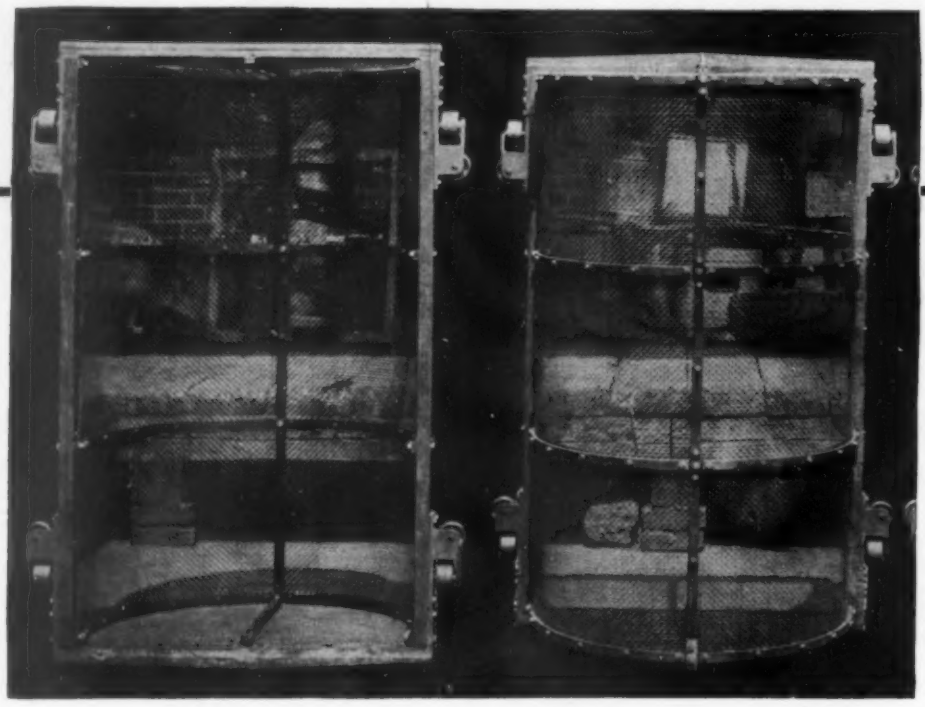
HAGAN BUILDING
PITTSBURGH 30, PA.

Everdur GIVES "very good results" IN RESERVOIR EQUIPMENT

Our authority for this statement is the New Haven (Conn.) Water Company. Mr. F. J. Callahan, Superintendent, says further:

". . . we have had very good results with Everdur for the past several years and have standardized on it for gate house screens, screen guides, ladder rungs, valve stems in gate houses, bolts used under water and in fact any metal that is used under water."



Two types of Everdur* screen frames used by New Haven Water Company at main outlets in reservoirs.

Everdur is superior in such applications because it is rust-proof and corrosion-resistant . . . has high strength which permits the use of light weight construction. Furthermore, this copper-silicon alloy is made in practically all commercial forms . . . can be easily fabricated and welded . . . is moderate in cost. Additional information is contained in Publication E-11, copy on request.

KEEP BUYING WAR BONDS REGULARLY

*Reg. U. S. Pat. Off.

ANACONDA from mine to consumer

Everdur Metal

THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Conn.

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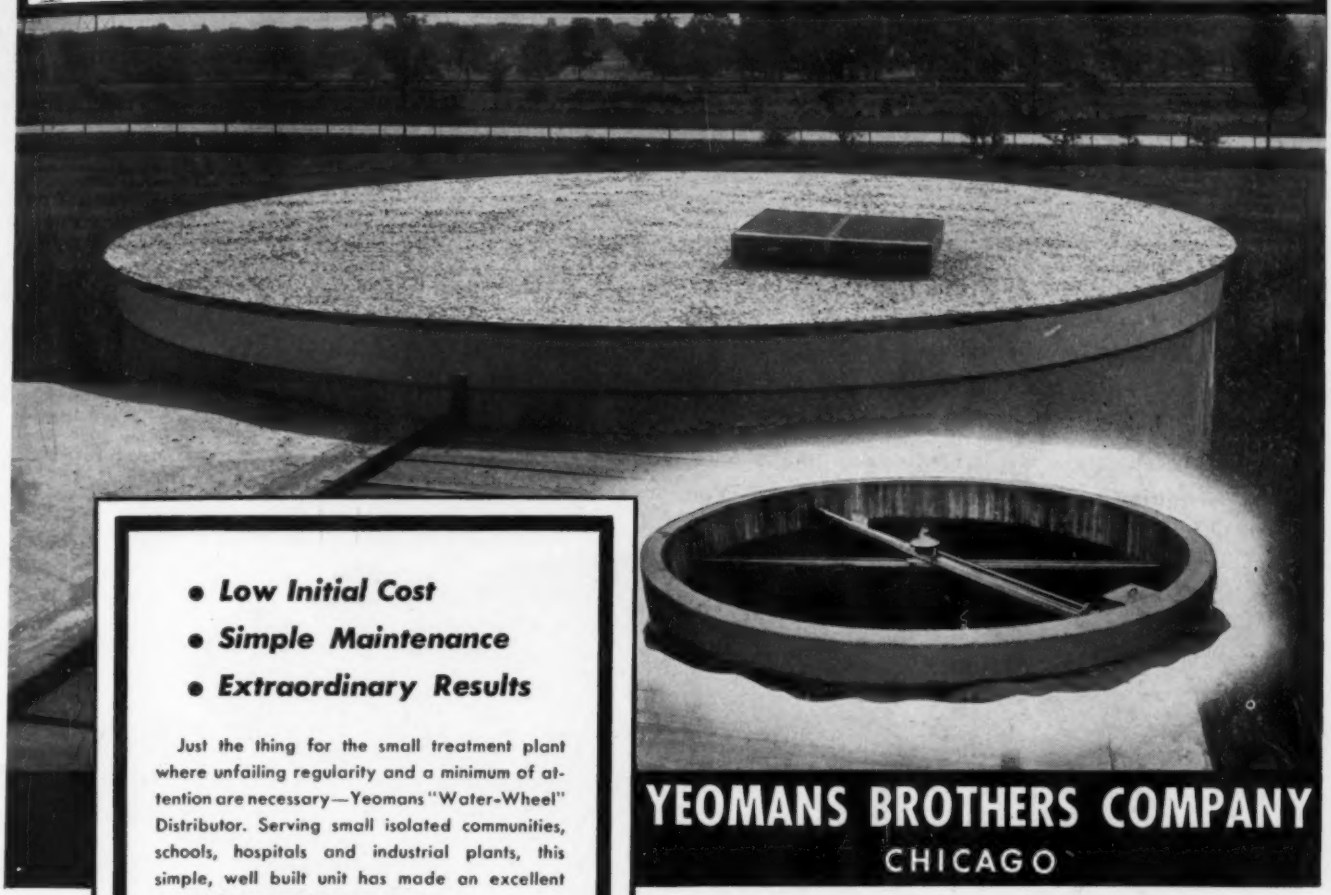
For small communities, institutions, industrial plants

YEOMANS *"Water-Wheel"* DISTRIBUTOR



- ***Low Initial Cost***
- ***Simple Maintenance***
- ***Extraordinary Results***

Just the thing for the small treatment plant where unfailing regularity and a minimum of attention are necessary—Yeomans "Water-Wheel" Distributor. Serving small isolated communities, schools, hospitals and industrial plants, this simple, well built unit has made an excellent record for dependable performance.

The distributing trough rotates only as the water-wheel buckets fill, at any rate of flow. And the V-notch type of feed avoids clogging that necessitates the frequent cleaning common to small reaction-type distributors. The V-notch openings with spreader plates are spaced to make sure of even distribution.

The "Water-Wheel" Distributor can be used with any kind of primary sedimentation tank. No dosing chambers or siphons are needed. Winter enclosure is inexpensive—no need for a costly high dome. No accessories required; and any good handy-man can install and service the unit.

New—Bulletin No. 6552 gives you full details on Yeomans "Water-Wheel" Distributor. Send the coupon.

YEOMANS PUMPS • GIVE YEOMAN SERVICE •

YEOMANS BROTHERS COMPANY
CHICAGO

93% REMOVAL OF 5-DAY B.O.D.
76% REMOVAL OF SUSPENDED SOLIDS
AT LAKE FOREST HOSPITAL

These test figures were taken from a typical weeks' operation of Yeomans "Water-Wheel" Distributor at Lake Forest Hospital, near Lake Forest, Illinois. The "Water-Wheel distributes over a 20 foot filter bed, and treats sewage from an institution of 220 persons —laundry, toilets and operating room wastes.

SEND COUPON . . . *There's no Obligation*

YEOMANS BROTHERS COMPANY
1423 North Dayton Street • Chicago 22, Illinois

Please send Bulletin No. 6552 with full description of Yeomans "Water-Wheel" Distributor.

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From a corrosion standpoint, where are you having trouble?

Are you having continual trouble because some piece of equipment can't stand up against corrosive attack? Do you have skylights, windows, doors and other structural members which suffer similarly? Aluminum isn't a cure-all. But it has overcome difficulties in many locations, or slowed them down to a point where aluminum's use is more than justified.

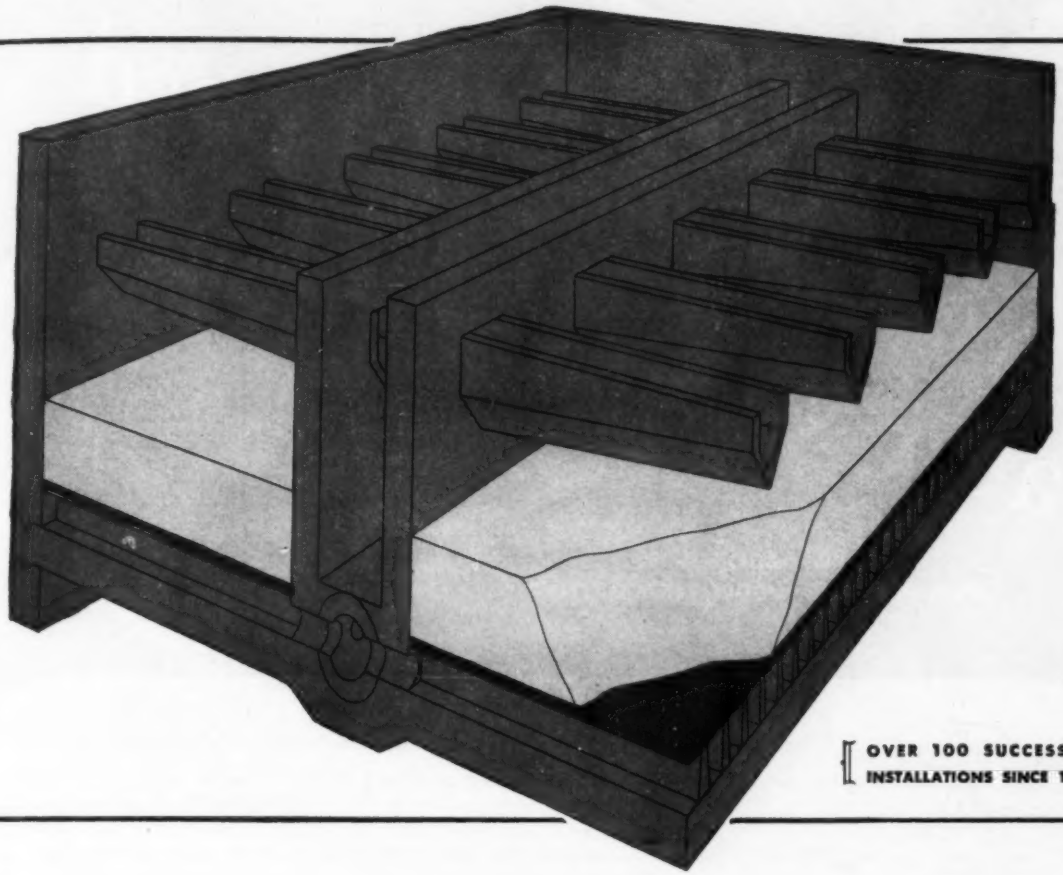
Often, these assignments are tough ones, requiring special consideration of alloys. You may find that even the aluminum must be safeguarded by protective coatings, cathodic protection or inhibitors. Our engineers have devoted years to studying ways of assuring maximum service with Alcoa Aluminum Alloys. They are well-fitted to advise you on such problems.

Jot down those spots where you'd like to consider aluminum. Then ask your nearest Alcoa office for help, or write ALUMINUM COMPANY OF AMERICA, 1955 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ELIMINATE FILTER BOTTOM EXPENSE AND TROUBLE

with the "ALOXITE" porous underdrain system



OVER 100 SUCCESSFUL INSTALLATIONS SINCE 1935

Simplicity of design is the basic reason for the benefits provided by this porous underdrain system. The filter media rest directly on "ALOXITE" ceramically bonded aluminum oxide plates. There is no graded gravel to become upset and cause inefficient filtration, inadequate back wash, mud balls—*and ultimate rebuilding expense.*

Further savings in construction and operation are realized through the reduced filter depth. Or, if existing filters are fitted with the "ALOXITE" system, the depth saved can be utilized to improve operating efficiency through increased rate of back wash or greater depth of filter media.

These points are proved! Since development of the "ALOXITE" porous underdrain system in 1935, more than 100 installations have reported successful realization of its benefits. These results have been obtained from both large and small installations—with all types of construction—on various kinds of water.

Write us for further details, and learn how the "ALOXITE" system can be put to work in your plant.

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Refractories Division
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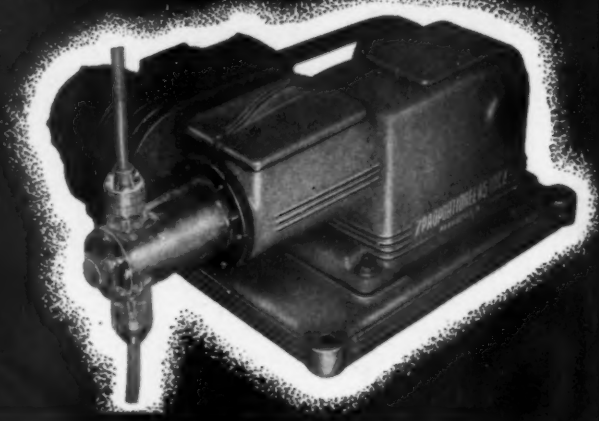
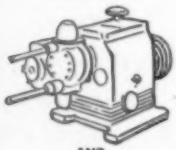
HEAVY DUTY CHEM-O-FEEDER

if you have a pumped water supply



°₀PROPORTIONEERS°₀
HIGH PRESSURE MIDGET CHEM-O-FEEDER

HEAVY DUTY CHEM-O-FEEDER



AND HIGH PRESSURE MIDGET CHEM-O-FEEDER

ARE PRODUCTS OF LONG EXPERIENCE

ECONOMICALLY PRICED

%Proportioneers% Chemical Feeders and Hypochlorinators treat pumped water supplies automatically with no more attention than refilling chemical reagent tank periodically.

For injecting chemical solutions into low or negative pressures, such as a pump suction, and positive pressures up to 100 pounds per square inch, such as pump discharge, we offer diaphragm type Chlor-O-Feeder and Chem-O-Feeder proportioning pumps. These feeders have no packing glands and are equipped with "See-Thru" plastic pump heads so that diaphragm and check valves can be observed while in actual operation.

For injecting chemical solution into positive pressures over 85 pounds per square inch up to 200 pounds per square inch, we offer plunger type Chlor-O-Feeders and Chem-O-Feeders with special "Fluid Sealed Yokes", which prevent air from reaching the packing gland, and hence prevent air binding, build-up on plunger, cutting of packing and subsequent packing failure.

%Proportioneers% Chlor-O-Feeders and Chem-O-Feeders, both diaphragm and plunger type, are backed by our years of experience gained from thousands of installations of these same Chlor-O-Feeders and Chem-O-Feeders in this country and abroad.

We will gladly furnish our recommendation and quotation on a suitable feeder for addition of calcium or sodium hypochlorite, alum, soda ash, lime slurry, Calgon, ferric chloride or any other chemical solution.

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"Chemical Feeder Headquarters"

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WATER WORKS & SEWERAGE

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E. S. Gillette, Publisher

EDITORIAL OFFICE
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L. H. Enslow, Editor

COMING!

Cathodic Protection

Is to our thinking a topic deserving of more study and greater consideration as a corrosion suppression measure of marked potentialities and wide application. Having learned of recent investigations and exact studies of the process in laboratory and field, which confirm or refute earlier conceptions of the process and throw new lights on the potentialities and limitations of this electrolytic anti-corrosion measure, arrangements have been made for a series of articles by a well grounded electrochemical engineer whose practical and research experience with the cathodic processes makes him well qualified to discuss theory, experimental evidence and practice in a highly revealing manner. He is—

LEE P. SUDRABIN, Chemical Engr.,
Electro Rust-Proofing Co., Dayton, Ohio.

Buffalo Water Department Makes Post-War Plans

And, while the idea of post-war planning is neither new nor unique, this particular article presents some interesting viewpoints and ideas on the matter. Projects to offset unemployment during reconversion, projects to improve department service, and projects to carry out long-deferred maintenance are all commented on by—

ALAN DRAKE,
Director of Water,
and
NEWELL L. NUSSBAUMER,

Orifices—Their Selection and Use

Most water and sewage works men, at one or another time, find use for the orifice as a means of flow measurement of liquid, gas or air, setting chemical solution feed rates, or even as a rate of flow control device. In a forthcoming article characteristics of the concentric orifice and its use are discussed. The design and methods of making and using orifices are given and a complete set of orifice tables accompanies this article by none other than a well-known contributor—

D. R. TAYLOR, Captain,
Corps of Engineers, U. S. Army.

Corrosion of Iron by Sulfides

Is an article which presents a number of typical cases wherein sulfides contained in the water, sewage, or sludge have been the cause of corrosion of iron. The phenomenon of sulfide corrosion, which is not an infrequent occurrence, is of practical importance and the principles of its action as well as suggested remedial measures are discussed in this paper by—

RICHARD POMEROY,
Consulting Chemist, Pasadena, Cal.

Ionic Equilibrium in Water

Are somewhat complex but the relations thereof have been simplified, and free CO_2, Carbonate, Bicarbonate, and Hydroxide Alkalinity may be calculated without limit of any range of alkalinity, solid content, pH, or temperature from total alkalinity and pH measurements, using a single alinement chart for the determination prepared by—

H. M. GIFFT, Assoc. Prof.,
Cornell Univ., Ithaca, N. Y.

Sewage Treatment Plant Design

As applied to the rebuilding of a sewage treatment plant faced with a war-time industrial waste load problem, not only sets forth the author's ideas on the subject of design but shows how they were applied at the Belgrave Sewer District Plant in Great Neck, L. I., where the Sperry Gyroscope Co. located a plant. The story, complete with diagram and pictures, is told by—

MAJOR THOMAS M. RIDDICK, USPHS (R),
Formerly Consulting Engr. and Chem.,
New York, N. Y.

Nomographic Solution of Manning's Formula Open Channel Flow

Is, as the name implies, a simple means of solving Manning's Formula for flow in open channels by means of a nomograph constructed for that purpose. The contributor is—

DONALD R. KIETH, Civil Engr.,
Div. of Water, Columbus, O.

VOL. 91, NO. 11

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Water Works & Sewerage is a monthly publication. Single Copies, 25 Cents; Subscription Rates U. S. and Canada, $2.00 per year; Foreign, $3.00 per year.

Sept 20, 1944
Superintendent
Water Department
Dear Sir:
I cannot understand why my water bill should be more than twice as much as it used to be before your man took out my meter for repairs. I am using no more water, so the meter must be fast. I would like to have an adjustment on my bill.
Very truly yours,
A C Jones

Letters of this kind are received when a Water Department first puts in a program of meter testing and repairing, especially where meters have remained untested for many years. Investigation of the consumer's premises will uncover toilet leaks, dripping faucets, etc. Experience shows that when these are pointed out, the consumer readily understands the reason for the bill.

Results: he has leaks repaired, returning his bills to normal . . . he gains a greater respect for the Water Department . . . and the Department receives revenue for water not previously paid for. And all the critical materials required for the pumpage and treatment of previously wasted water are saved.

Consult your Trident representative. He will be glad to give you the benefit of his experience in the best methods of testing and repairing meters.

112

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Branch Offices in CHICAGO, SAN FRANCISCO, LOS ANGELES, PORTLAND, ORE., DENVER, DALLAS, KANSAS CITY, LOUISVILLE, ATLANTA, BOSTON,
Neptune Meters, Ltd., Long Branch, Ont., Canada

WATER WORKS & SEWERAGE

VOL. 91. No. 11 *A Gillette Publication* NOVEMBER, 1944

SELECTING DEEP WELL CENTRIFUGAL PUMPS

By AXEL O. FABRIN
Pump Engineer
MEMPHIS, TENN.

PART II

TO NAME the modern makes of deep well pumps on the market is relatively simple and to describe their merits, both actual and affected, is somewhat laborious, but the best criterion for judgment on pumping machinery is the behavior of a pump under actual service conditions. A deep well pump handles water in its raw state, just as it exists in the native water-bearing strata. Since the water in these strata must percolate or travel through various formations, it follows that the quality or composition of the water is affected by the vegetation and minerals through which it must pass. Since ground waters may originate many miles away from the well, the type of vegetation at origin differs from that at the well site, and the water in passing through the decomposed vegetation absorbs carbonic and traces of other acids which increases its power of solution and enables it to attack mineral matter which would otherwise be insoluble.

It is obvious that there are myriads of combinations possible because of natural phenomena, but from observation it appears that the amount of residual carbon dioxide gas (CO_2) can be used as a measure in estimating the life of iron and steel used in pump construction, since CO_2 will tend to affect the iron just as it did the minerals in the earth structure. For these reasons the life of deep well pumps cannot be set at any specific number of years unless the corrosivity of the water is known or can be predicted with reasonable certainty.

In considering the functional efficiency of a deep well supply system, the factors to be considered are CO_2 content, the size of well and pump, hours of operation, cost of power and purchase price.

The Author

Functional efficiency is not measured by numerical values but a high degree of the quality is reflected in economical performance with a minimum operative attention throughout a long life of dependable service with a minimum of repairs.

Choice of Pump Size

Articulated study on the combined subject of wells and pumps, with due respect for the various factors mentioned, indicates that pumps of preferential diameter when installed in wells of complimentary proportions will in most cases perform at optimum efficiencies that insure a high degree of functional efficiency. The deep well centrifugal is made in a number of sizes to furnish water in various quantities, but a given capacity, motor speed, and specific speed does not necessarily mean that only one diameter of pump can be utilized. For example, a 1350 GPM pump operating at 1750 rpm. and designed for a "specific speed" of approximately N_s1850 can be either 16½-in. in diameter or 14½-in.

The 16½-in. pump will be the most efficient, since the water passages are not crowded and the annular space between the rim of the moving impeller and the stationary walls of the case permit a favorable path for negative accelerations of the absolute velocity of water leaving the impeller. Such a design will result in a machine which the writer has designated as Class "A" and it will develop optimum efficiency.

The 14½-in. pump will have more confined passages, a narrower annular space between impeller and case, and a relatively high angle of water impingement against the walls of the stationary case. This condition favors what has been termed "impingement corrosion." Such a design will not produce a pump of optimum efficiency and has been categoried by the writer as Class "C".

Annular Space

The subject of annular space proportions beyond the moving impeller periphery becomes interesting, since it determines how close we approach the ideal conditions of flow which permit the maximum efficiency in converting the true absolute water velocity leaving the impeller into pressure head. The ideal conditions utilize the principle of the constancy of the moment of momentum.

Part I, describing the deep well centrifugal pump, the casing and factors affecting pump systems appeared in last month's issue.

In considering this principle of design, and neglecting friction, it is axiomatic that no turning movement is transmitted to the water after it leaves the impeller and with the moment of momentum remaining constant the velocity at the outer boundaries of the annular space must be less than the true absolute velocity at the impeller, in the inverse ratio of the respective radii.

In the Class "A" pumps the annular space is larger than in the Class "C" and when this larger space is provided with stationary guide vanes whose angles of interception are correct, the conversion of velocity head during the change in direction of flow to an upward one is accompanied with a minimum of "impingement corrosion" and a maximum of hydraulic efficiency.

There is practical evidence to the effect that so-called "graphitic corrosion" or galvanic corrosion is more pronounced in small diameter pumps of Class "C", even when handling relatively neutral solutions of water because the cast iron bowls must handle higher velocities than the Class "A".

Between the limits indicated as Class "A" and "C" there may be as many sizes as fancy may dictate; in fact, sizes smaller than "C" may be employed, but so far practice has shown that values indicated reflect contemporary design.

The example just presented pertained to two pumps of practically the same Ns value but of different diameter, in order to show the efficiency difference of 4 points in favor of the larger diameter unit.

If a well casing of minimum diameter is striven for, the pump selection will be forced to a high value of N_s and will result in a diameter about 65 per cent of that of the Class "A" or optimum pump. The small pump will be a Class "C" unit, running at an N_s of 4100. Such a pump will, for reasons presented, have a shorter life than that of the larger pumps and the efficiency will be less than that of a pump of a lower N_s—one more nearly approaching 2500 N_s.

As has been stated, pumps operating at an N_s of 2500 develop favorable efficiencies and, regardless of class, any duty that places the N_s above or below this value must be considered on the grounds of overall economics. Loss of money, due to shortened life and lowered efficiency through the use of small pumps, is often accepted because it permits the construction of a small diameter well. Since the first cost of a well is from 3 to 5 times that of a pump, the well is often crowded to minimum diameter without regard for later financial costs.

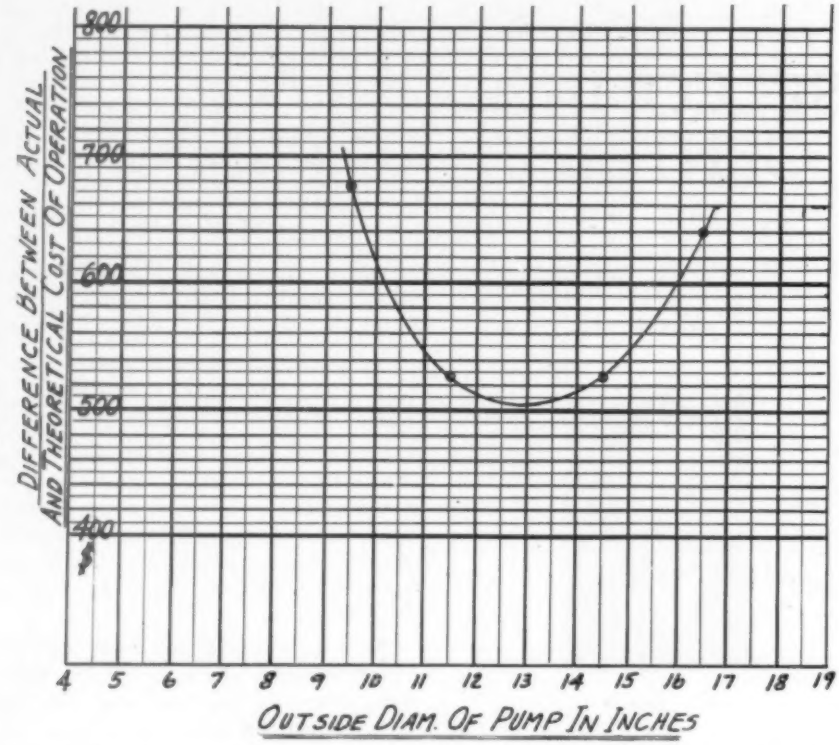

DIFFERENCE BETWEEN ACTUAL AND THEORETICAL COST OF OPERATION
800
700
600
500
400
$
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
OUTSIDE DIAM. OF PUMP IN INCHES

Fig. 5. Chart Showing Difference in Cost of Operation Between Actual and Theoretical Pumps of Different Sizes

(*Conditions*—1000 *gpm.*, 260 *ft. Field Head*, 1750 *rpm.*; *operation* 12 *hrs. a day*, 365 *days or* 4380 *hr. per yr with power at* 1 *cent per KWH.*)

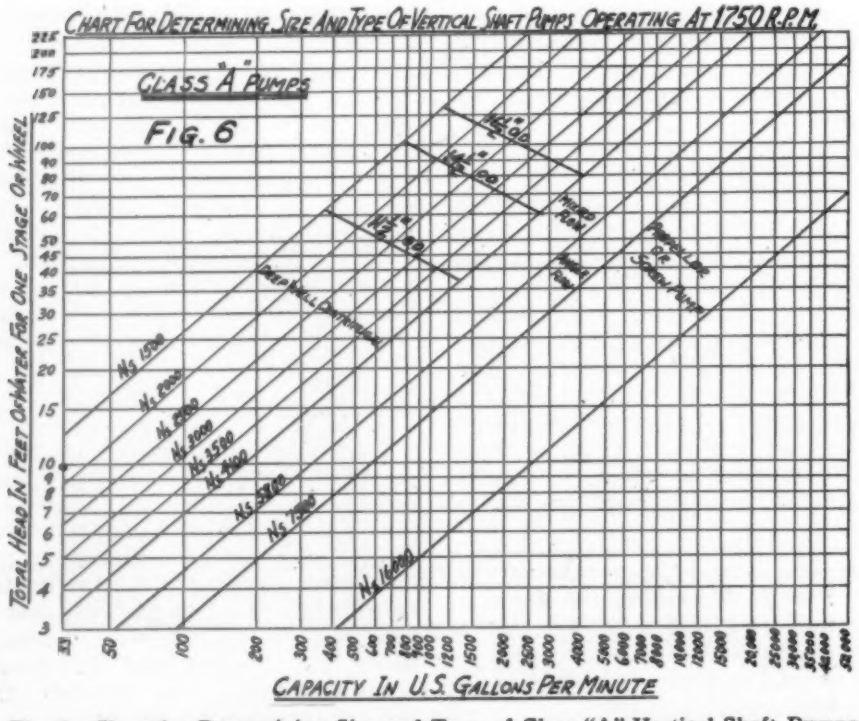


CHART FOR DETERMINING SIZE AND TYPE OF VERTICAL SHAFT PUMPS OPERATING AT 1750 R.P.M.
CLASS "A" PUMPS
FIG. 6
TOTAL HEAD IN FEET OF WATER FOR ONE STAGE OR WHEEL
CAPACITY IN U.S. GALLONS PER MINUTE

Fig. 6. Chart for Determining Size and Type of Class "A" Vertical Shaft Pumps Operating at 1750 rpm.

Operating Costs

If there is a choice between the two wells and pump sizes, and it can be shown that the annual savings realized by using the large size will in a reasonable time pay the extra cost of the larger well, then it will be good business to consider Class "A" pumps operating at an N_s near 2500. The cost of wasted power is fixed by the class of pump, the

N_s, the number of stages and the purchase price of power.

To arrive at this cost calculate the power cost of operating an actual pump and deduct from this the power cost of a theoretically perfect pump. Data based on observations extending over a long period make possible charts that can be used in calculating the total annual cost of operation for a series of variable diameter pumps of a given hydraulic duty.

Fig. 5 has been prepared to show the difference in power cost between the actual and theoretical values of four different pump diameters, all to deliver 1000 gpm against 260 feet of head when set in a well to a depth of 150 feet and operating at 1750 rpm.

The curve is based on 12 hours a day operation, 365 days a year, with power purchased at 1c per kwh. The four pumps in the example are designed to operate in wells 10-12-15-18 inches in diameter and 500 feet deep.

Table I, from which values were taken to plot the curve, shows the difference in power cost between the practical and theoretical pumps for each size:

TABLE I

I.D. of Wells and Nominal Pump Size	O.D. of Pumps	Annual Difference Between Power Costs of an Actual Pump and a Theoretically Perfect Unit
10	9½	$674.52
12	11½	525.60
15	14½	525.60
18-17	16½	639.48

From the figures in Table I which apply only to the hydraulic conditions given, it would appear that the 12-in. or 15-in. pumps would make an even choice.

Both pumps could be purchased for approximately the same price, and in fact all four pumps could be purchased for essentially the same money. But since the wells cost from 3 to 5 times that of pumps, the question is—would it pay to construct a 12-in. or 15-in. well even though sufficient water could be procured from a 10-in. well.

The cost of constructing wells can and does resolve itself into a subject of debate. The price will vary with the type of well, the method of construction, the kind of strata encountered and many other features so familiar to a well expert. But if all these conditions are known and the only difference between the wells is diameter, then a value can be assumed which will cover the extra cost per foot for every inch increase in size of one well casing over another.

TABLE II
Recapitulation Table

Difference in Cost of Wasted Power	Difference in Well Cost	Years of Operation of One Size to Pay for Extra Cost of Another	Remarks
Between 10-in. and 12-in. Pump = $148.92 in favor of 12-in. pump	Between 12-in. and 10-in. $400.00 more for 12-in. well	$\frac{400}{148.92} = 2.7$ years of 12-in. pump operation to pay for extra cost of 12-in. well over 10-in.	12-in. pump and well is the logical selection
Between 12-in. and 15-in. Pump = No difference	Between 15-in. and 12-in. $600.00 more for 15-in. well	15-in. well and pump will not show favorably	15-in. pump and well should not be considered
Between 15-in. and 17-in. Pump = $113.88 in favor of 12-in. pump	Between 18-in. and 15-in. $600.00 more for 18-in. well	17-in. pump and 18-in. well—Neither well or pump favorable	17-in. pump and 18-in. well should not be considered

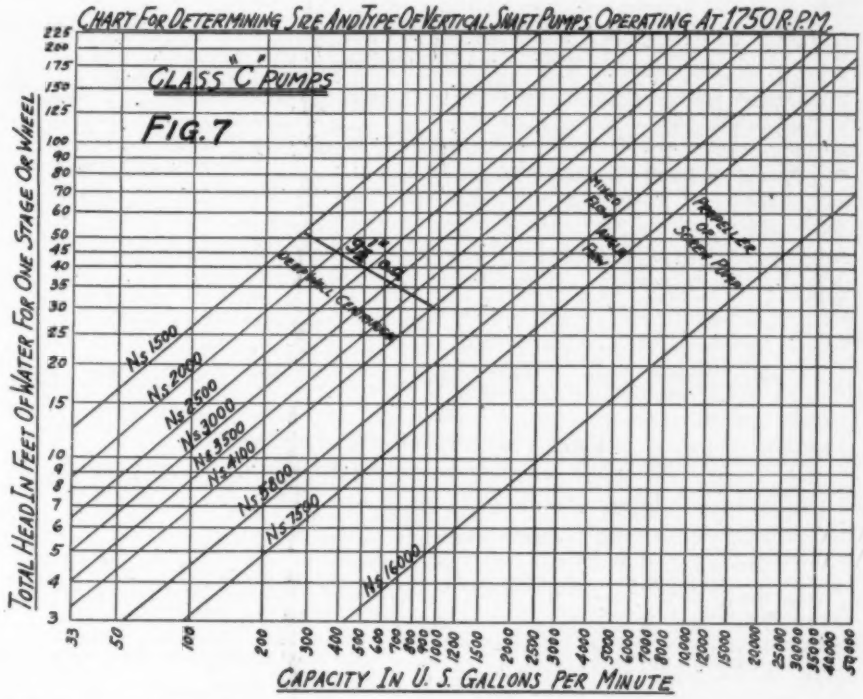


Fig. 7. Chart for Determining Size and Type of Class "C" Vertical Shaft Pumps Operating at 1750 rpm.

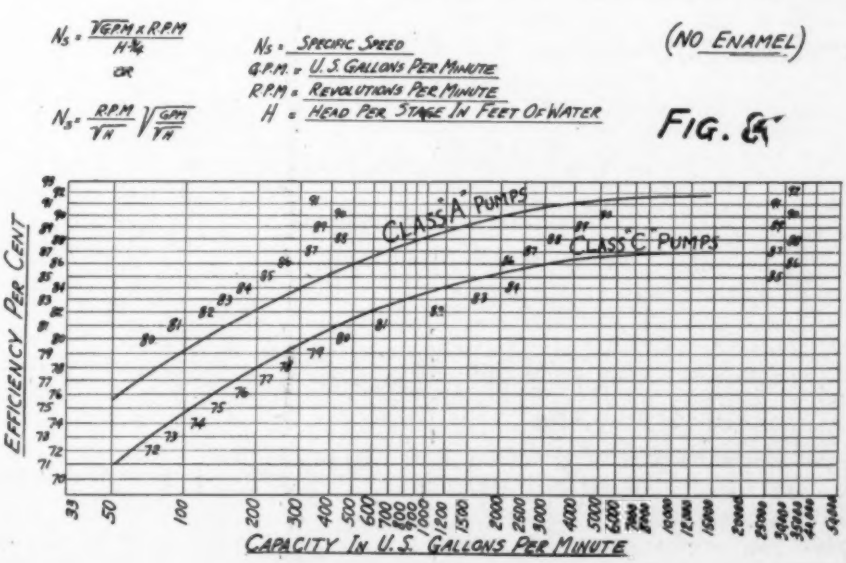

$N_s = \frac{\sqrt{G.P.M.} \times R.P.M.}{H^{3/4}}$
OR
$N_s = \frac{R.P.M.}{\sqrt{H}} \sqrt{\frac{G.P.M.}{H}}$
Ns = SPECIFIC SPEED
G.P.M. = U.S. GALLONS PER MINUTE
R.P.M. = REVOLUTIONS PER MINUTE
H = HEAD PER STAGE IN FEET OF WATER
(NO ENAMEL)
FIG. 8
EFFICIENCY PER CENT
CLASS "A" PUMPS
CLASS "C" PUMPS
CAPACITY IN U.S. GALLONS PER MINUTE

Fig. 8. Basic Efficiency Chart

(For Five Stage Deep Well Centrifugal Pumps of Different Capacitiss Operating at the Specific Speed of 2500)

In the example chosen for illustration this value of cost difference has been arbitrarily set at 40 cents per inch of diameter for every foot of depth. The difference between costs of successive well sizes, 500 feet deep, will be as follows :

WELL COSTS

Between	Difference in Cost
10 and 12	$400.00
12 and 15	600.00
15 and 18	600.00

A table can be prepared showing the difference in cost of wasted power between two pumps of varying diameter, and the difference in cost of the wells. From these data can be determined the time in years for the saving in operating power cost of the larger pump over the smaller to pay for the higher priced well. Such a table (Table II) may be designated as a recapitulation.

The effect of efficiency on costs has been illustrated by table and graph and the description and illustration of pump types have been presented in Fig. 4 accompanying Part I of this article, but the method of procedure whereby the costs have been calculated may prove interesting. Four calculation sheets showing the detail of this item are presented as tables III, IV, V, and VI, pertaining to the units on which the cost analysis in curve Fig. 5 and Table I have been used.

Charts that limit the selection and prescribe values are indeed of the essence in selecting pump sizes, and without such means all of the matter presented in our considerations would be without support, and could be relegated to the category of trite repetitions of the obvious and self evident.

Charts for finite pump speeds have been prepared and two such charts (Fig. 6 and 7) are presented, one for Class "A" and one for Class "C" pumps. Both are based on 1750 rpm and are presented to support the examples used in illustrating the text.

Values of efficiency for pump selection are determined through the means of two charts (Fig. 8 and 9) and Table VII.

Fig. 8 is termed the "Basic Efficiency Chart" and the two curves deliberated thereon denote efficiencies for Class "A" and "C" five stage pumps for various capacities operating at N_s 2500.

Fig. 9 is "The Specific Speed Factor Chart" which determines the factor by which the Basic Efficiency must be multiplied to obtain the efficiency for specific speeds other than N_s 2500. Three curves are illustrated to accommodate the quality of workmanship in finishing the impellers. It will be noted that efficiency is materially affected by workmanship. The effect on the final efficiency by stage variation is prescribed in Table VII.

After modifying the Basic Efficiency of a five stage pump by the Specific Speed factor locate this value in the five stage column in Table VII and project horizontally to the column for the number of stages under consideration.

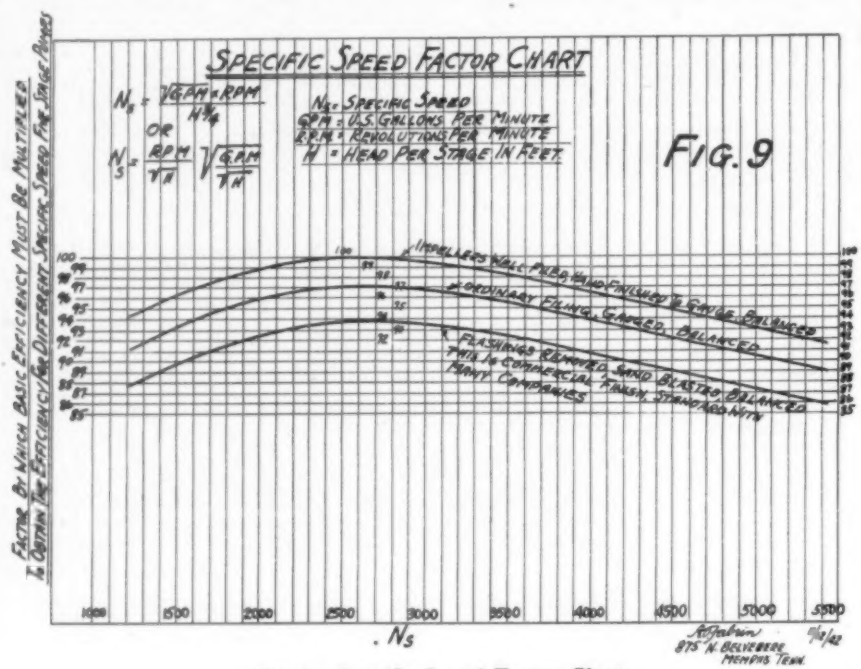

SPECIFIC SPEED FACTOR CHART
FIG. 9
$N_s = \frac{N\sqrt{GPM}}{H^{3/4}}$
OR
$N_s = \frac{RPM}{TH}\sqrt{\frac{GPM}{TH}}$
N_s = SPECIFIC SPEED
GPM = U.S. GALLONS PER MINUTE
R.P.M. = REVOLUTIONS PER MINUTE
H = HEAD PER STAGE IN FEET
FACTOR BY WHICH BASIC EFFICIENCY MUST BE MULTIPLIED TO OBTAIN THE EFFICIENCY FOR DIFFERENT SPECIFIC SPEED FOR SINGLE BOWLS
A. IMPELLERS WELL MACHINED AND FINISHED IN CASTING, BALANCED
B. ORDINARY FINISH, CLEANED, BALANCED
C. FINISHING REMOVED, SAND BLASTED, BALANCED
THIS IS COMMERCIAL TRUSH, STANDARD WITH MANY COMPANIES
100 1500 2000 2500 3000 3500 4000 4500 5000 5500
N_s
A. F. Jabron
875 N. BELVEDERE
MEMPHIS, TENN.
9/9/42

Fig. 9. Specific Speed Factor Chart

TABLE III

Calculation Sheet for 10-in. Pump

Capacity, U. S. gpm., 1000 — Field Head, ft., 260 — R.p.m., 1750
Setting to Top of Bowl, ft., 150 — N_s for One Stage, 4350
Size Pump, 10-in.; Class "C," 4100 — Number of Stages, 9
Column Size, 8-in. — Line Shaft Size, 1 11/16-in.
Size Motor—100 hp. — Phase 3 — Cycle 60

Computation of Head

Surface to Pumping Level	=	105.00 ft.
Head Above Surface	=	155.00 ft.
Sum = Field Head	=	260.00 ft.
Add to Field Head Friction in 150-ft. Column	=	5.85 ft.
Sum of Field Head and Column Friction Lab. or Total Dynamic Head	=	265.85 ft.
Laboratory Efficiency	=	8.22%

Computation of Customer's Cost

Motor	=	$ 976.00
Disch. Casting	=	115.00
Column	=	700.00
Pump Bowl	=	570.00
Total		$2321.00

Computation of Horsepower

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.}}{3960}\right)}{82.2 \text{ Lab. Eff.}}\right] = 81.70 \text{ hp.}$$

Hp. Loss in 150 ft. 1 11/16-in. Shaft = 2.15 hp.

Sum = Field hp. = 83.85 hp.

Calculation of Field Efficiency

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 260 \text{ Field Hd.}}{3960}\right)}{83.85 \text{ Field Hp.}}\right] = 78.4\%$$

Calculation of Wire to Water Efficiency

Wire to Water Eff.
78.4 Field Eff. × 90 Motor Eff. = 70.5%

Calculation of Power Costs

Cost per Hour of Actual Operation

$$\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{70.5 \text{ Wire to Water Eff.}}\right) = \$0.71 \text{ per Hr.}$$

Theoretical Cost per Hour at Given Motor Eff.

$$\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{.90 \text{ Motor Eff.}}\right) = \$0.556 \text{ per Hr.}$$

Difference in Cost Between Actual and Theoretical = $0.154 per Hr.

Diff. Bet. Actual and Theo. Cost of Oper. for Year of 4380 Hrs. = $0.154 × 4380 = $674.52

TABLE IV

Calculation Sheet for 12-in. Pump

Capacity, U. S. gpm., 1000 Field Head, ft., 260 R.p.m., 1750
Setting to Top of Bowl, feet, 150 N_s for One Stage, 3200
Size of Pump, 12-in.; Class "A," 3000 Number of Stages, 6
Column Size, 8-in. Line Shaft Size, 1 11/16-in.
Size Motor—100 hp. Phase 3 Cycle 60

Computation of Head

Surface to Pumping Level	=	105.00 ft.
Head Above Surface	=	155.00 ft.
Sum = Field Head	=	260.00 ft.
Add to Field Head Friction in 150-ft. Column	=	5.85 ft.
Sum of Field Head and Column Friction Lab. or Total Dynamic Head	=	265.85 ft.
Laboratory Efficiency	=	86.7%

Computation of Customer's Cost

Motor	=	$ 936.00
Disch. Casting	=	115.00
At Surface	=	700.00
Column	=	600.00
Total		$2351.00

Computation of Horsepower

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.}}{3960}\right)}{86.7 \text{ Lab. Eff.}}\right] = 77.50 \text{ hp.}$$

Hp. Loss in 150 ft. 1 11/16-in. Shaft = 2.15 hp.

Sum = Field hp. = 79.65 hp.

Calculation of Field Efficiency

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 260 \text{ Field hd.}}{3960}\right)}{79.65 \text{ Field Hp.}}\right] = 82.5\%$$

Calculation of Wire to Water Efficiency

Wire to Water Eff.
82.5 Field Eff. × 90 Motor Eff. = 74%

Calculation of Power Costs

Cost per Hour of Actual Operation

$$\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{74 \text{ Wire to Water Eff.}}\right) = \$0.676 \text{ per Hr.}$$

Theoretical Cost per Hour at Given Motor Eff.

$$\left(\frac{1000 \text{ gpm.} \times 265.85 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{90 \text{ Motor Eff.}}\right) = \$0.556 \text{ per Hr.}$$

Difference in Cost Between Actual and Theoretical = $0.120 per Hr.
Diff. Bet. Actual and Theo. Cost of Oper. for Year of 4380 Hrs. = $0.120 × 4380 = $525.60

TABLE V

Calculation Sheet for 15-in. Pump

Capacity, U. S. gpm., 1000 Field Head, ft., 260 R.p.m., 1750
Setting to Top of Bowl, ft., 150 N_s for One Stage, 1930
Size Pump, 15-in.; Class "A," 2000 Number of Stages, 3
Column Size, 10-in. Line Shaft Size, 1 11/16-in.
Size Motor—100 hp. Phase 3 Cycle 60

Computation of Head

Surface to Pumping Level	=	105.00 ft.
Head Above Surface	=	155.00 ft.
Sum = Field Head	=	260.00 ft.
Add to Field Head Friction in 150-ft. Column	=	1.50 ft.
Sum of Field Hd. and Column Friction Lab. or Total Dynamic Head	=	261.50 ft.
Laboratory Efficiency	=	85.12%

Computation of Customer's Cost

Motor	=	$ 936.00
Disch. Casting at Surface	=	141.50
Column	=	900.00
Pump Bowl	=	600.00
Total	=	$2577.50

Computation of Horsepower

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 261.50 \text{ TDH.}}{3960}\right)}{85.12 \text{ Lab. Eff.}}\right] = 77.50 \text{ hp.}$$

Hp. Loss in 150 ft. 1 11/16-in. Shaft = 2.15 hp.

Sum = Field hp. = 79.65 hp.

Calculation of Field Efficiency

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 260 \text{ Field Hd.}}{3960}\right)}{79.65 \text{ Field Hp.}}\right] = 82.5\%$$

Calculation of Wire to Water Efficiency

Wire to Water Eff.
82.5 Field Eff. × 90 Motor Eff. = 74%

Calculation of Power Costs

Cost per Hour of Actual Operation

$$\left(\frac{1000 \text{ gpm.} \times 261.50 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{74 \text{ Wire to Water Eff.}}\right) = \$0.667 \text{ per Hr.}$$

Theoretical Cost per Hour at Given Motor Eff.

$$\left(\frac{1000 \text{ gpm.} \times 261.5 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{90 \text{ Motor Eff.}}\right) = \$0.547 \text{ per Hr.}$$

Difference in Cost Between Actual and Theoretical = $0.12 per hr.
Diff. Bet. Actual and Theo. Cost of Oper. for Year of 4380 Hrs. = $0.12 × 4380 = $525.60

The exact value of the "Modified Basic Efficiency" may not be found in the five stage column but by locating the nearest value it will be possible by interpolation to determine the final efficiency.

Conclusions

In conclusion, the writer wishes to state that this seemingly hypothetical method of pump selection is not the result of abstract reasoning but rather is based on the observation of thousands of deep well pumps. The performance of many modern units now in operation in cities and industries confirm and sustain the values which the proposed procedure predicates.

No consideration has been given to porcelain enamel pumps and it is admitted that temporary increases of from 1 to 4 points can be obtained, by the use of this finish. The state of the art in pump manufacture questions a complete and indiscriminate endorsement of this practice on all pumps.

The useful life of deep well pumps is materially affected by the corrosiveness of water and, since ground water varies in composition, one locality will present problems distinctly different from that of another.

Mechanical failure due to structural defects or variations in design or improper installation also affect the life of pumps.

In fact, the influence of these factors are of such importance that they justify more than passing mention and warrant a complete discussion solely devoted to the subject.

The method set forth in this paper regards only the hydraulic performance and the propositions have been proven true to fact in many installations of both small and large pumps.

Five large units recently made for a synthetic rubber plant, designed for 11,000 gpm. and total heads of 160 feet operating at 1170 rpm., developed efficiencies that compliment the procedure outlined in this text. Thees pumps were two stage machines with outside diameters of 27⅞-in.

In another instance fifteen 30½-in. O.D. units, each designed as single stage pumps to deliver 13,000 gpm., at 133 feet total head operating 1200 rpm., likewise complemented this test.

These designs executed by the writer and many others covering pumps of different sizes have proven the practicability of the proposed method of pump selection.

TABLE VI

Calculation Sheet for 17-in. Pump

Capacity, U. S. gpm., 1000 — Field Head, ft., 260 — R.p.m., 1750
Setting to Top of Bowl, ft., 150 — N_s for One Stage, 1420
Size Pump, 17-in.; Class "A," 1500 — Number of Stages, 2
Column Size, 10-in. — Line Shaft Size, 1 11/16-in.
Size Motor—100 hp. — Phase 3 — Cycle 60

Computation of Head

Surface to Pumping Level	=	105.00 ft.
Head Above Surface	=	155.00 ft.
Sum = Field Head	=	260.00 ft.
Add to Field Head Friction in 150-ft. Column	=	1.50 ft.
Sum of Field Head and Column Friction Loss or Total Dynamic Head	=	261.50 ft.
Laboratory Efficiency	=	81.5%

Computation of Customer's Cost

Motor	=	$ 936.00
Disch. Casting at Surface	=	141.50
Column	=	900.00
Pump Bowl	=	600.00
Total	=	$2577.50

Computation of Horsepower

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 261.5 \text{ TDH.}}{3960}\right)}{81.5 \text{ Lab. Eff.}}\right] = 81.00 \text{ hp.}$$

Hp. Loss in 150 ft. 1 11/16-in. Shaft = 2.15 hp.

Sum = Field hp. = 83.15 hp.

Calculation of Field Efficiency

$$\left[\frac{\left(\frac{1000 \text{ gpm.} \times 260 \text{ Field Hd.}}{3960}\right)}{83.15 \text{ Field Hp.}}\right] = 79\%$$

Calculation of Wire to Water Efficiency

Wire to Water Eff.
79 Field Eff. × 90 Motor Eff. = 71

Calculation of Power Costs

Cost per Hour of Actual Operation

$$\left(\frac{1000 \text{ gpm.} \times 261.50 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{71 \text{ Wire to Water Eff.}}\right) = \$0.694 \text{ per Hr.}$$

Theoretical Cost per Hour at Given Motor Eff.

$$\left(\frac{1000 \text{ gpm.} \times 261.50 \text{ TDH.} \times .0001884 \times .01 \text{ Rate per Kw. Hr.}}{90 \text{ Motor Eff.}}\right) = \$0.548 \text{ per Hr.}$$

Difference in Cost Between Actual and Theoretical = $0.146 per Hr.

Diff. Bet. Actual and Theo. Cost of Oper. for Year of 4380 Hrs. = $0.146 × 4380 = $639.48

TABLE VII

Efficiency Corrections for Various Stages*

Number Stages								
1	2	3	4	5	6	7	8	9
50	...	...	...	...	...	...	...	...
51	...	...	...	...	...	...	...	...
52	...	...	...	...	...	...	...	...
53	...	...	...	...	...	...	...	...
54	...	...	...	...	...	...	...	...
55	...	...	...	...	...	...	...	...
56	57.5	58.5	59.5	60	60.5	60.5	60.5	60.5
57	58.5	59.5	60.5	60.5	61	61	61	61
58	59.5	60.5	61.5	61.7	62	62	62	62
59	60.7	62	62.7	62.9	63.2	63.2	63.2	63.2
60	62	63	64	64.2	64.5	64.5	64.5	64.5
61	62.7	64	64.7	64.9	65.5	65.5	65.5	65.5
62	63.5	65	65.5	66	66.5	66.5	66.5	66.5
63	65	66	67	67.5	68	68	68	68
64	66	67.2	68	68.5	69	69	69	69
65	67	68.5	69	69.5	70	70	70	70
66	67.6	69	70	70.5	71	71	71	71
67	68.6	70.2	71	71.5	72	72	72	72
68	69.5	71	71.9	72.5	73	73	73	73
69	70.7	72	72.7	73.5	74	74	74	74
70	71.5	73	74	75	75.5	75.5	75.5	75.5
71	73	74.5	75.2	76	76.5	76.5	76.5	76.5
72	74	75.2	76.5	77	77.6	77.6	77.6	77.6
73	75.2	76.7	77.5	78	78.5	78.5	78.5	78.5
74	76	77.5	78.4	79	79.5	79.5	79.5	79.5
75	77.2	78.7	79.6	80.2	80.9	80.9	80.9	80.9
76	78	79.5	80.7	81.5	82	82	82	82
77	79	80.7	81.6	82.5	83	83	83	83
78	80	81.5	82.5	83.4	84	84	84	84
79	81	82.5	83.5	84.2	85	85	85	85
80	82	83.5	84.5	85	86	86	86	86
81	83	84.5	85.7	86.2	87	87	87	87
82	84	85.5	87	87.5	88	88	88	88
83	85	86.5	88	88.5	89	89	89	89
84	86	88	89	90	90.5	90.5	90.5	90.5
85	87	89	89.8	90.5	91	91	91	91
86	88	89.5	90.5	91.5	92	92	92	92

*As revised Feb. 11, 1944. Original 1-19-42.

Basing a conclusion on over 10,000 installed units indicates that the majority of requirements can be efficiently served by pumps where "specific speed" per stage ranges from approximately 2000 to 3000.

This does not mean that pumps of higher N_s values do not have a field of operation. There are circumstances wherein wells are repaired by liners inserted in the upper casing to blank off sections where corrosion or other causes have punctured the original structure. A liner of small diameter properly secured will save an expensive well and the final cost, even when using a small pump, will be less than if a complete new well were constructed.

It is believed that an investigation of installed deep well turbine pumps will substantiate the methods proposed in this paper. Aside from proving its validity by comparison with installed units, it is hoped that, by selecting sizes for new projects with respect for optimum performance, better results and greater economy will flow to the users of well water.

Now It Can Be Told

London Suffered 3000 Water Main Damages in the Air Blitz

Many a water works man has wondered what the true facts were concerning the extent of damage which water mains in London and its environs suffered during the air raids of 1940.

Now that facts may be told in this case, Herbert Morison, England's Home Secretary and Minister of Home Seceurity, reveals that there were more than 3000 instances of damage to water mains in the London Metropolitan Area resulting from bombings of September and October 1940.

It was also stated that even though preparations had been made to cope with expected water main damages, the rapidity with which water service could be restored was only made possible through the availability of main repair reinforcements supplied by other water authorities—some from even as far away as Scotland. Thus, was proved the indispensability of mutual aid in times of distress or when catastrophe strikes so important a service as the public water supply.

FED. OF SEWAGE WORKS ASSNS. 16TH ANNUAL MEETING*

Part I

Demonstration of Safety Equipment a Feature

Presidents

(Retiring)
A. M. Rawn
Chief Engineer
County Sanitation Districts
Los Angeles, Calif.

(Incoming)
A. E. Berry
Director
San. Engineering
Ont. Dep't Health
Toronto, Ont.

MEETING in Pittsburgh, Pa., October 12-14, the Federation of Sewage Works Associations held its 16th* Annual Meeting in conjunction with the Annual Conference of the Pennsylvania Sewage Works Association.

Five hundred and twenty-three persons, including thirty-five ladies, registered for this meeting which consisted of five technical sessions and a smoker, banquet, and pre-convention get-together. Thirty-one manufacturers had reserved and utilized exhibit space.

Registration, while not as high as in Chicago or New York (the two previous meetings), nevertheless could be considered good in view of the relatively light local membership in the area compared to Chicago and New York.

Board Action

At the final meeting of the 1944 Board of Control, officers and directors were elected for the ensuing year:

President
A. E. Berry
Toronto, Ontario

Vice-President
Admiral J. K. Hoskins
Washington, D. C.

Treasurer
W. W. DeBerard
Chicago, Ill.

Secretary-Editor
W. H. Wisely
Champaign, Ill.

*At the Board of Control meeting it was decided that although this was only the 5th Annual Technical Conference, it actually was the 16th Annual Meeting of the Federation, and therefore the meeting should be reported as the 16th Annual Meeting.

A new innovation in the holding of a Board of Control Session was instituted at this meeting. The final meeting of the Board of Control for the current year was held on the day before the technical sessions began, while the first meeting of the Board of Control for the ensuing year was held on Saturday afternoon following the technical sessions.

At the Saturday meeting of the 1945 Board the directors voted to hold the 1945 Annual Meeting in Toronto, Ontario, Canada. The exact date for the meeting was not set, but it may be expected to be in late September or early October.

It was also at this meeting that the Board voted to category the Pittsburgh meeting as the Federation's 16th Annual Meeting.*

Honored

Dr. F. W. Mohlman
Editor Emeritus of the Federation
(Made Honorary Member)

Honors and Awards

At the annual banquet, retiring president, A. M. Rawn, presented award certificates to the following persons:

Honorary Membership:
To Dr. Floyd William Mohlman, Chicago, Ill.

The Harrison Prescott Eddy Award:
To Dr. John R. Snell, Chief, Water and Sanitation Section, 1st Service Command, Boston, Mass., "for his paper reporting outstanding research entitled 'Nitrogen Changes and Losses During Anærobic Digestion,' published in *Sewage Works Journal*, July, 1943."

The Geo. Bradley Gascoigne Award:
To James T. Lynch and Uhl T. Mann (respectively plant superintendents at Auburn and Cortlandt, N. Y.), "for their joint paper exhibiting work beyond the usual call of a plant operator, entitled 'Rotary Vacuum Filtration of Sludge and the Effect of War on Operation,' published in the September, 1943, *Sewage Works Journal*."

The Charles Alvin Emerson Award:
To Dr. Willem Rudolfs, New Brunswick, N. J., "for his outstanding service in the affairs of the Federation of Sewage Works Associations."

The Kenneth Allen Awards:
Voted by individual associations to members who have performed outstanding service to that association, as follows:

Albert Edward Berry (Canadian)
Van Porter Enloe (Georgia)
Albert Legrand Center (Md.-Del.)
F. Wellington Gilcreas (New Eng.)
Charles A. Holmquist (New York)
Dana Ewart Kepner (Rocky Mt.)
Leon Benedict Reynolds (Calif.)
Wilson Waldo Towne (Dakota)

Attendance Award

The Central States Sewage Works Assn. won the attendance award based on the man-miles of travel. This year a new award was presented, the old cup having been carried off by CSSWA three times previously. W. D. Hatfield, Pres. of the CSSWA accepted the award on behalf of his Association.

Award Winners

Dr. W. Rudolfs
Director
N. J. Expt'l Sta.
New Brunswick, N. J.

Dr. J. R. Snell
San. Engr.
1st Service Com.
Boston, Mass.

Vice-Pres.
J. K. Hoskins
Rear Admiral
U.S.P.H. Service
Washington, D. C.

Exec. Sec'y.
W. H. Wisely
Federation Secretary
Champaign, Ill.

Mr. & Mrs. J. M. Cravn
Chicago Pump Co.
Cleveland, Ohio

Mr. & Mrs. L. S. Morgan
Pa. Dept. Health
Greensburg, Pa.

Mr. & Mrs. John J. Wirts
Sup't, Sew. Treatment
Cleveland, Ohio

Mr. & Mrs. T. C. Schaetzle
Sup't, Sew. Treatment
Akron, Ohio

Mr. & Mrs. Frank Schwemler
Ass't Dir. of Utilities
Cleveland, Ohio

Pres. Rawn Opens Sessions

In opening the technical sessions on Thursday morning in Pittsburgh, A. M. Rawn, Pres. of the Federation, spoke of the analogy of water works and sewage works operators to the battery of a baseball team. Where the water works man is the pitcher, the sewage plant operator is the catcher, catching everything that comes his way, giving the ball a little polish and returning it to the pitcher again. Thus did Pres. Rawn indicate the essential role of the sewage works operator in the field of municipal hygiene.

Mr. Rawn introduced Frank M. Rossing, Commissioner of Public Works, in Pittsburgh. Speaking for Mayor C. D. Scully, Mr. Rossing welcomed the members of the Federation. Mr. Rossing also paid tribute to the men who work with the sewers, citing the wonderful work done in England during the war. Mr. Rossing knew whereof he spoke for he had visited London during the blitz and observed the work of the department of public works employees and their auxiliaries.

Secretary Wisely Reports

As a part of the business session, W. H. Wisely, Exec. Secy. of the Federation, reported on the establishment of the Federation's permanent headquarters in Champaign, Ill. With the addition of two Associations, the Federation now has 28 member associations. Total individual membership has reached 3,000, a substantial gain in the past year. The *Sew. Works Journal* has 3700 subscriptions and, last year, carried more pages of text than ever before. It also carried 20 pages more of advertising than the previous year.

Wisely also reported that the first Manual on Sewage Works Practice will be issued this year. This manual will be entitled "Occupational Hazards". The Federation also has a committee working with ASCE, APHA, and AWWA on a glossary of terms used in connection with sanitary engineering, including hydraulics, water and sewage treatment, stream pollution, and public health.

The membership contest which was held during the past year offered

President and First Lady
"A. M." and Mrs. Rawn of Los Angeles

two prizes; first for the association showing the greatest percentage gain, won by The Missouri Conference with a gain of 185 per cent; and second for the association showing the greatest gain in actual numbers, won by the Central States with a gain of 134 members. The Federation financial assets have improved and now have reached more than $28,000.

Final Report—Blueprint Now!

Speaking as the representative of the Federation on the Committee on Water and Sewage Works Development, C. A. Emerson reviewed the organization of the Committee and its aims, all of which were based on, and symbolized by the slogan Blueprint Now! In a brief summation of the work of the committee, Mr. Emerson said that, with $18,000 available, the committee had obtained the services of E. L. Filby (on leave from Black and Veatch, Engrs., Kansas City) and had sent Mr. Filby travelling more than 50,000 miles around the country spreading the gospel of **Blueprint Now!** The committee had 30,000 brochures printed and distributed and 150,000 stickers were also distributed. Mr. Filby has visited state and municipal officers in 38 states, as well as attending and speaking before more than thirty meetings.

For the ensuing year the Water Works Manufacturers' Association will make available $10,000 for the work of the committee, but there will be no full-time director and the activities of the committee will be centered around the idea of **"Blueprint Now in Action!"**

Mr. Emerson said that the Federation Board, in considering the activities of the Committee, had reaffirmed its published statement of policy, but had decided that partial aid of the Federal Government would be desirable in cases where municipal financing alone could not meet the problem. The Federation also believes that the Committee is a promoter not a sales agency.

Over a period of 20 years, according to Mr. Emerson, water works facilities had amounted to 2.6 per cent of the total construction, while sewerage works had accounted for 4 per cent of the total construction. During the past year, however, it is indicated that post-war plans show that, of the total construction planned, 6 per cent is for water works

Mr. & Mrs. Van Porter Enloe
Sup't Sew. Treatment
Atlanta, Ga.

Mr. & Mrs. Dan. E. Davis
The Chester Engrs.
Pittsburgh, Pa.

Mr. & Mrs. Homer Wisely
Federation's Exec. Secy.
Champaign, Ill.

Mr. & Mrs. Earl Johnson
Distr. Mgr., W. & T. Co.
Pittsburgh, Pa.

Mr. & Mrs. Jo. Egolf
Distr. Mgr., Ludlow Valve Co.
Pittsburgh, Pa.

Mr. & Mrs. Harry Schlenz
V.-P. Pacific Flush Tank Co.
Chicago, Ill.

Mr. & Mrs. Carl McGuire
Sup't Treatment Wks.
Columbus, Ohio

Dr. & Mrs. Floyd Mohlman
Chicago Sanitary Dist.
Chicago, Ill.

*Mr. & Mrs. Bernie Bush**
Distr. Engr., Pa. Dept. Health
Wilkes Barre, Pa.

*Mr. & Mrs. L. D. Matter***
Distr. Engr., Pa. Dept. Health
Harrisburgh, Pa.

*(*Secy.-Treas. Penna. Sewage Wks., Assn. **New President, Penn. Sewage Wks. Ass'n.)*

and 11 per cent for sewage treatment.

Citing these same figures in his discussion, E. L. Filby said this indicated that the efforts of the Committee had sold the idea, and he believes that it will continue to sell the idea. Mr. Filby is not in agreement with the idea of Federal aid, believing that it acts as an opiate and prevents municipalities from initiating the steps that result in action. Mr. Filby also said that a bill for appropriations by the Federal Govt. had been passed but no appropriations had been made.

Mr. Filby recommended, for serious reading, the book issued by the University of Indiana and the State of Indiana on how to finance municipal water and sewerage improvements without resorting to Federal aid. (See review following this report.)

In order that the committee may know how well it is succeeding, it was suggested that clippings from local papers be forwarded to the Committee headquarters at 500 Fifth Ave., New York 18, N. Y. The program also requires the support of the manufacturers and the magazines if it is to succeed.

Dr. A. E. Berry from Ontario gave a few remarks on the matter of post-war planning in Canada. Many cities are now making definite plans. The matter of Dominion aid is still a question, but there is a definite desire of municipalities to obtain lower interest rates and, if these become a fact, then municipal financing will probably be used to a greater extent.

Stream Pollution Control

At the annual Federation Luncheon the speaker was Alexander H. Stewart, M.D., Secretary of Health and Chairman of the Sanitary Water Board, of the Commonwealth of Pennsylvania. Dr. Stewart spoke on "Stream Pollution Control in Pennsylvania" and remarked that, if all the streams in the state were laid end to end, they would total more than 100,000 miles.

Hosts

Larry S. Morgan
Distr. Engineer
Pa. Dept. Health
Greensburg, Pa.
(Chmn. Convention Mgment. Comm.)

T. S. Bogardus
Prof. of Engin'ring
Baldwin Wallace Col.,
Berea, Ohio
(Immediate Past Pres. Pa. Sewage Wks. Ass'n.)

On the banks of these streams lie more than 1000 incorporated municipalities, and into these streams flow a variety of industrial wastes as well as the sanitary sewage from these municipalities. Most of the water supplies in Pennsylvania are taken from surface waters, and thus the need for stream pollution control is evident. This control began in 1905 and the work of the Sanitary Water Board in control of pollution became more important when, in 1937, the control of the industrial waste was given to the San. Water Board.

In closing, Dr. Stewart said that the ideal of the Board was embodied in this quotation, "The people have the fundamental right to clean streams and a supreme right to the original purity of the stream."

Operation of Sewerage Systems—*A Symposium*

In the absence of Eugene T. Cranch, Director of Pub. Wks., New Rochelle, N. Y., the paper on **"Locating Lost Sewers and Manholes"** was read by C. A. Emerson. Mr. Cranch's paper dealt with the application of electronic pipe locators to the locating of sewers in his city, where the population is 58,000 persons. Rapid growth and development as a suburb of New York City had resulted in many dead-end streets and sewers and drains installed by real estate developers. Maps of such developments were generally inadequate, incorrect, or non-existent.

To locate these sewers and manholes, Mr. Cranch used flexible sewer rods and the M-Scope. Typical of the findings was one where maps showed the sewer to be on the east side of the street, whereas it was actually found on the west side. For long sewers not too deep, the M-Scope signal could be picked up for a distance of approximately 200 feet. Manholes would be dug at that point and the search continued from there.

Some false readings may be ob-

The Closing Dinner-Dance

Caught by the camera, we recognize—Mrs. A. M. Rawn with Roy H. Ritter (Balto, Md.); Mrs. Jack Wirtz (Cleveland), and friend Jack; Mrs. Harry Schlenz (Chicago) and some lucky guy; Miss Gladys Swope (Mellon Inst.) and Karl Maun (N. Y.); Mrs. Homer Wisely (Champaign) and Johnnie Mackin (Madison, Wis.)

Exhibits

Just a sample of the Best Illuminated Booths of Member Firms in the Federation and the Water and Sewage Wks. Mfgrs. Ass'n. (Mine Safety Appliance Co.; Jeffrey Mfg. Co.; Yeomans Bros.; Chain Belt Co.)

tained. Once a steel barrel was located, and often water pipes were found. Thus it was necessary to test the signal in all directions to make sure that a pipe was not indicated. The method is applicable in depths up to 15 ft., but is best when the sewer has a shallow cover. Manholes, many of which were buried on private property, were located without unnecessary digging.

In a paper on **"Control of Infiltration and Storm Water Flows,"** Ralph W. Horne, of Fay, Spofford, and Thorndike, Cons. Engrs. of Boston, discussed the results of a survey he had made. Less than 16 per cent of the persons replying knew anything about infiltration in their systems.

Mr. Horne pointed out that excess ground water, or storm water, in sanitary sewers adds to operating costs. Rates of infiltration vary from 5500 to 1,400,000 gal. per mile per day in those systems studied. Reasonable infiltration may be put at 30,000 gal. per mile per day for high ground water level and 20,000 gal. per mile per day for low level. Good workmanship on sewer construction will halve these values, and poor workmanship will double them. Making certain assumptions as to power costs etc., Mr. Horne estimated that each 10,000 gal. per mile per day would add $3066 per year to operating costs for activated sludge plants.

Cause of infiltration may be attributed to three items; leaky joints, cracks in jointing material or manholes, and cracks in pipes. On the basis of unit length of pipe, asbestos cement pipe had the lowest leakage because of its long length and consequent fewer joints per foot of pipe.

Trends in jointing compounds are towards bituminous materials. Specifications for construction should be fairly rigid to improve conditions; particularly as to jointing, cradles, bearing surfaces, etc., to prevent cracking and joint distortion.

Mr. Horne also discussed cellar and roof drainage, stating that to accept the latter into a sanitary sewer was a luxury indeed, and quite wrong except in certain areas where no other choice could be had.

Convention Attendance Trophy

Won for Fourth Time by the Central States Assn., is Being Held by President "Bill" Hatfield and Immediate Past-President Don Bloodgood of C.S.S.W.A.

In the discussion which followed the paper, it was suggested that a better unit of measurement for infiltration is gal. per mile per inch diameter per day. It was also brought out in the discussion that storm water often helped the activated sludge process and was, therefore, not the complete liability that Mr. Horne had pictured it. It was likewise suggested to the speaker that it was wrong to assume that costs of operation increased as a straight line function of the volume of flow. Doubling the pumpage of sewage does not often double the pumping costs, because of pumping efficiency and power rates, the former of which may go up and the latter down as flows increase.

In the absence of Richard D. Pomeroy, Consulting Chemist of Pasadena, Cal., his paper on **"Ventilation of Sewers"** was read by the program chairman, F. W. Gilcreas, of Albany, N. Y.

Mr. Pomeroy's paper gave six reasons for sewer ventilation:

1. To eliminate lethal atmosphere (oxygen deficiency, H_2S or cyanides where the cyanide content of the sewage is above 10 ppm.)
2. To eliminate explosive atmosphere (gases from dry cleaning fluids).
3. Reduce corrosion by H_2S.
4. Prevent corrosion of plumbing in houses (by H_2S).
5. Prevent escape of odors.
6. Prevent oxygen depletion in sewage.

There are three ways to maintain ventilation including holes in manhole covers, which do not eliminate the hazard of explosion. Venting through house plumbing is a second method to be used in connection with manhole venting. This method does not dry out the sewer and has the disadvantage that it carries H_2S into the plumbing instead of away from it.

The third method is forced draft, now being used at Melbourne, Australia and Los Angeles, Cal. Two hundred cfm. of air will dry out the sewer. At Los Angeles, this ventila-

Booth of the Graver Tank & Mfg. Co. Chicago

President Rawn addressing the Penna. Sewage Wks. Assn. at their Luncheon Session where honor was paid Charlie Emerson and "Ted" Moses—Federation Veteran Wheel-Horses

Booth of the Aluminum Co. of America Pittsburgh

tion removes 60 lb. of H_2S each day, thereby preventing the formation of sulfuric acid sufficient to attack the concrete to a depth of 0.06 in. per year

In forced ventilation the distance and size of sewer are important and, while forced ventilation is most effective, it is not a cure-all. Before forced venitlation is installed, the sewer gases should be checked to determine the amount of ventilation needed and the effectiveness to be expected. Another method of treating sewage to eliminate corrosion is to add ammonia (60 lb. per day in Los Angeles would be required) to neutralize the acid formed. Still another method is to chlorinate upsewer to prevent the formation of hydrogen sulfide (H_2S).

Programmers

N. E. Anderson, Design Engr., Sanitary Distr., Chicago

W. B. Hart, Engr., Atl. Refining Co., Philadelphia

R. F. Brown, Sup't Sewer. Maint., Los Angeles

T. C. Schaetzle, Supt. Sewage Treat., Akron, Ohio

R. S. Ingols, School Public Health, Ann Arbor, Mich.

Safety Equipment

Under the leadership of Le Roy VanKleeck, who is chairman of the Sub-committee on Occupational Hazards in the Operation of Sewerage Systems, the committee had assembled most if not all of the safety equipment which will be discussed in the forthcoming Federation Manual on Occupation Hazards. Spread across the large speakers' table, and overflowing onto the floor, were more gadgets and devices than the average sewage plant operator had ever dreamed were available for his safety.

Members of the committee aided Mr. VanKleeck in the presentation of the material, each one having certain topics and equipment to discuss. Taking part in the demonstration with Mr. VanKleeck were S. H. Ash, Principal Mining Engineer, U. S. Bureau of Mines, Washington, D. C.; Reuben F. Brown, Supt. of Sewer Maintenance, City of Los Angeles, Cal.; and L. L. Langford, Pacific Flush Tank, New York City.

The first demonstration was devoted to fire extinguishers of different types, and explanations of when not to use certain types of extinguishers. Included in the demonstration were the piston pump hand extinguisher using carbon tetrachloride, the sulfuric acid-soda ash extinguishers, the foam extinguishers,

Programmers

E. L. Filby, Black & Veatch Engrs., Kansas City, Mo. (Blue Print Now!)

L. W. Van Kleeck, Conn. Dept. of Health, Hartford, Conn. (Safety First!)

carbon dioxide blanket extinguishers and water.

Physical injuries was the second topic discussed, with demonstrations of first aid, handling wounded persons, stretcher technique and related problems. What to do in the case of broken bones, eye injuries, back injuries, and other specific cases were discussed.

Body infections, and means of prevention, were emphasized as imporant parts of First Aid in sewage plants. The use of rubber gloves, shoe rubbers, and coveralls, were emphasized as means of preventing infections of the skin. Liberal use of first aid kits in cases of cuts and abrasions are advocated. (One practice, not mentioned but which this reporter has advocated and insisted on when in sewage plants, is that the operators and samplers wash their hands before eating and keep their hands away from the face at all times whether or not gloves are used. It is surprising how careless operators, samplers, and laboratory technicians and chemists will become in the matter of not washing after sewage has come in contact with the hands.)

Noxious gases as a hazard to sewerage systems operators and workers may include a number, sometimes not thought of as noxious.

Oxygen deficiency ranks highest among the noxious gases, while explosive gases probably come second. Although a man may live in a reduced oxygen atmosphere, there are limits both as to per cent of oxygen and length of time. Explosive gases include the familiar methane, hydrogen, and gasoline vapors; carbon monoxide and hydrogen sulfide also are explosive. Each gas has its own explosive mixture rating with air.

Drug-like gases are a third type in this group and include gasoline. Poisonous gases are a fourth type and include the simple asphyxiants which cause death because of the exclusion of oxygen, the chemical asphyxiants such as carbon monoxide which forms a compound with the blood, and other poisons like hydrogen sulfide. Last in the group of noxious gases are the irritant gases causing coughing or the lacrimators causing tears.

There are simple and combined pieces of equipment to detect these various types of noxious gases including the oxygen deficiency lamps, the explosion meter, and detectors for carbon monoxide and hydrogen sulfide. The latter gas is toxic in quantities as low as 0.0025 per cent if breathed for eight hours.

In the matter of using the

Programmers

Roy Lanphear, Supt. Sewg. Treatm't Worcester, Mass.

H. Heukelekian, Associate W. & S. Research, New Brunswick, N. J.

Thos. J. Powers, Supt. Treatment Dow Chem. Co., Midland, Mich.

H. W. Gehm, Adviser Pulp & Paper Ind., New York, N. Y.

Wm. S. Wise, Chief Engr. State Water Comm., Hartford, Conn.

equipment, it was emphasized that properly trained technicians should handle the equipment. This is particularly true in the matter of masks for gases. Any person who has to use a mask should be thoroughly trained not only in how to put it on, and when to put it on, but also as to its limitations.

Cannister masks are used to remove gases from the atmosphere. The most usual is the acid cannister which is good for removing chlorine and acid gases. Where more than one type of gas may be encountered the All-purpose cannister mask should be used. The latter type of cannister, while capable of removing more than one type of gas, does not have the length of life that the single cannister has. Cannister masks should not be used indefinitedly. If the mask has had one use it is better to put down that it was used twice as long as it was actually used, for such precaution may save a life by not trying to over-tax its capacity. Cannister masks that are not used to full capacity in the first use will not have the full remaining capacity available after standing for a period of time.

Persons in charge of a plant or sewer gang should be thoroughly familiar with all types of masks and all types of risks. They should not delegate men into situations fraught with danger unless they, too, go in or are not afraid to enter.

The hose mask which depends on the pumping of fresh air has many advantages. It has been successfully used, both in sewers and in sludge digestion tanks.

Oxygen masks may be used in many places, even under water, but should not be used under high pressures as in tunnelling jobs.

Among the miscellaneous types of safety equipment shown were many explosion-proof electrical devices and connections, including flashlights, extension cords with lights, electrical switches, and other items of similar nature.

(Two other papers were prseented on the Friday morning session but space does not permit the reporting of those papers until part II of the report, which will appear next month.) (G.E.S.)

Indiana's Remarkable "Know-How" Brochure on Water Works & Sewerage Betterments

More outstanding than any similar thing that has yet come to our attention is Indiana's new 100-page brochure "Water & Sewerage Systems of Indiana—The Planning of Future Construction Now."

This remarkable volume was developed as a joint undertaking by the Department of Government of Indiana University and the Division of Sanitation of the Indiana State Department of Health, for the purpose of stimulating planning of water supply and sewerage betterments throughout Indiana as post-war projects. It was prepared expressly as a guide to municipal officials and a "know-how" handbook on the planning of and ways and means of legally financing new water and sewage works, or securing and paying for betterments to existing systems.

In such limited space we can not attempt a complete review of the Indiana brochure, but must content ourselves with a high recommendation of this inspiring and useful volume to one and all who may be or should be interested in securing water supply or sewerage betterments for his community, or in aiding municipal officials in this direction. Especially are the following sections of the brochure illuminating and praiseworthy—"Why Carry on Water Works & Sewerage Improvements?"; "The Financial Capacity of Municipalities"; "Legal Methods of Financing Water and Sewage Works Betterments"; "Sound Financing, without Jeopardizing the Borrowing Power of a Community." Of particular interest to those officials responsible for initiating actions looking toward the construction of water works or sewerage facilities is that section devoted to "Suggestions for Getting Started."

It is our wish to pay high tribute to those who were most responsible for the production of this brochure, which we would term "the 'Red Book' of the Blue Print Now movement." These are the authors—Professors John E. Stoner and Pressly S. Sikes of Indiana University—and Joseph L. Quinn, Jr., Acting Director of the Division of Sanitation. Indiana State Dept. of Health, to whom the authors give credit as being the "main-spring" behind the project.

We understand that a copy of Indiana's "Red Book" can be had by any who may be sufficiently interested to address a request to the Division of Sanitation, Indiana State Dept. of Health, Indianapolis, Ind.

Dan Rupp Killed by Troop Train

Dan Rupp

Daniel H. Rupp, for a number of years Sup't. of Filtration and Pumping at Topeka, Kan., was fatally injured when struck by a troop train on the Rock Island Railroad near the Topeka plant on October 23rd. He was 48 years old and a bachelor.

Mr. Rupp was in the course of crossing the tracks when he was struck by the unscheduled troop train passing another train which he was watching go by. He died only a few minutes after being struck and badly mangled.

Dan Rupp, a native of Reading, Pa., began his career as water works chemist in Ohio. From there he went to Oklahoma City as chemist in charge of filtration, and then to the Topeka plant in 1930. He was a member of several water works associations and had only last year received the Geo. W. Fuller Award from the American Water Works Association for meritorious achievement in water purification. He was a Rotarian and member of the Engineers' Club of Topeka and the American Legion. By all who knew Dan Rupp he was admired for his personality, as well as his technical ability.

Beckett Heads State Sanitary Engineers

The Conference of State Sanitary Engineers meeting in New York, the day before the opening of the APHA meeting early in October, elected as chairman, R. C. Beckett, State Sanitary Engr. of Wilmington, Del., and as vice chairman, John M. Hepler, Director, Bur. of Engineering, State Dept. of Health, Lansing, Mich. Harold N. Old, Sr. San. Engr., USPHS, Washington, D. C., was appointed Secy.-Treas. by the Surgeon General.

Among the many topics discussed at the meeting were the Study of Waste Disposal Methods by the Paper and Pulp Industry, Post-War Plans, Housing Surveys, and Environmental Sanitation.

MUNICIPALITIES CAN FINANCE IMPROVEMENTS IF THEY MAKE THE EFFORT

By W. F. TEMPEST*
CHICAGO

IN 1934, severe drought conditions in the middle west caused great loss and serious concern for water supply sources. Loss, due to shortage of water and the depletion of ground water supplies, was aggravated by the pollution of natural water courses. Orders against offending cities issued by State Health Department authorities were met by flat statements that there were no means of financing the construction of sewage treatment works. The federal government took notice of the critical situation and offered aid to municipaltiies seeking to finance worth-while public improvements. Loans from the Reconstruction Finance Corporation, and later PWA, enabled a large number of cities to acquire sewage disposal plants and improved waterworks. This considerable volume of construction also gave substantial relief to the unemployment situation created by the depression.

Today, 10 years later, we have again experienced drought conditions, with the consequent low water courses and receding ground water. Construction of sewage disposal plants and waterworks has necessarily been curtailed since 1940. The need for action, seeking improvement of sanitation to protect public water supply sources, is now even more urgent than it was in 1934. Fortunately, state and municipal finances are in better condition than a decade ago. Almost any municipality that would make the proper effort could now finance needed waterworks and sewerage improvements. It can be done, but the means to do it must be sought by the municipality. This requires hard work for officials and public-spirited citizens. It means keeping everlastingly at it to overcome the indifference of great numbers of people to something which is considered remote from their personal interest. Actually, public water supply and sanitation are so vital it is sometimes taken for granted that the needs will be met somehow without individual effort. This is unjustified complacency.

The Author

Even in the matter of advancing proposed construction of needed waterworks and sewerage improvements to the planning stage, there is a serious lag. A survey made by the *Engineering News-Record* shows that, up to September of this year, a little more than 50 per cent of the proposed work in sewerage construction had been advanced to the planning stage. Unfortunately, even this is not general throughout the nation. A large proportion of the present advance planning is in a few states and in cities with population over 100,000.

This lag in planning was emphasized in an excellent address by Colonel William N. Carey at the recent Public Works Congress in St. Paul, Minnesota. Also, at this meeting of the American Public Works Association, the subject of advance planning of municipal finances and the need for examination of existing State legislation was ably discussed by Dr. C. H. Chatters, Executive Director of the Municipal Finance Officers' Association.

Ten years ago, a national survey was made of needed waterworks and sewerage projects. The replies received from communities throughout the nation, when tabulated, resulted in such a staggering total that telegrams were sent to the city officials reporting, requesting that the estimate of needed work be cut down to include only those projects most urgently needed. The revised estimates of urgently needed waterworks and sewerage projects totaled over one billion dollars; approximately $550,000,000 for waterworks and $460,000,000 for sewerage.

A recent inventory compiled by the United States Public Health Service shows the need for an estimated dollar volume of sewage disposal facilities in excess of two billion dollars. The latest available figures on advance planning under way or completed, for sewerage improvements, is only about 20 per cent of the needed construction. This would not be so discouraging if there were some assurance that most of the work planned could be built or that plans were being considered for financing actual construction.

An earlier estimate of the backlog of sewerage projects shows approximately $218,000,000 worth of work planned for post-war construction. It is not possible to determine how much of this contemplated work represents projects that were classed as urgently needed 10 years ago. It is shown that only part of the urgently needed construction was actually built before the war. It is reasonable to assume, therefore, that the $218,000,000 post-war sewerage plans consist largely of projects that ought to be built immediately or as soon as limitations on materials and construction are removed. As pointed out in the survey, it should be remembered that these figures do not include highly necessary industrial waste treatment projects.

Let it be impressed on the earnest reader right here that the majority of these urgently needed projects will not be constructed for a long time unless the municipalities, the officials and the citizens make a united effort to get them financed and built.

This statement is substantiated by a paragraph in the report of the American Society of Civil Engineers on Advance Planning. It is stated:

"At the moment comprehensive data are not available as to the number or value of projects actually ready to advertise for bids. Many projects for

"Public sentiment is everything. With public sentiment, nothing can fail. Without it nothing can succeed."

—ABRAHAM LINCOLN.

*The author (W. F. Tempest), a member of the Committee on the Joint Administration and Collection of Water and Sewer Accounts of the American Waterworks Association, is an engineer and attorney at law, on the staff of the Highways and Municipal Bureau of the Portland Cement Association.

which plans are reported in the completed stages are not in the bidding stage because land rights are not cleared, legal obstacles not overcome or financial arrangements not completed."

The "Blueprint Now" Gospel

The field director of the Water & Sewage Works Development Committee has done splendid missionary work in spreading the gospel of "Blue Print Now." It is too much to expect that any one single effort could be the motivating force that would sustain the drive neecssary for progressive programs in widely scattered places over the entire United States. What has been done is only the beginning—the initial effort to overcome the inertia of setting the machinery in motion. It will not keep it running. Fuel, in the form of public information, must be consecutively used in fairly uniform amounts, and without let-up.

In the past, promotional efforts have too commonly been spasmodic. The effort pattern has taken the form of a sine curve rather than a straight line. Good-will advertising, education, or whatever we choose to call it, should be one of the established policies of all waterworks and sewerage departments. One suggestion is to transmit some bit of interesting information with the monthly or quarterly bills.

Of more importance is the follow-up with professional and business organizations, both local and national. As needs and conditions change, legislative provisions should be examined to make sure that they are adequate at least for the forseeable conditions. Greater support should be given to Municipal Leagues and professional associations. More encouragement should be given, and expenses provided for engineers and officials to attend and participate in bona fide technical meetings of local and national groups. Suggestions along these lines have often been expressed. The point stressed here is that the need for this *continuous* cooperation should be constantly kept before the public.

A frank statement should be made by each responsible official concerning the conditions he has to contend with in the discharge of his duties. A concise periodical report to the citizens, with concrete suggestions for improvements, will usually stir up enough discussion that action will be taken to support the official who honestly and sincerely presents the actual needs.

Overcoming the Obstacles

In presenting the need for sewerage improvements there are many obstacles to be overcome. When it is

Photo by Don Suesen, Peoria Star

Landscaped Surroundings for Peoria, Ill., Sewage Treatment Plant

directed by the state health department to prevent stream pollution, it is generally regarded as a local expense for the other fellow's benefit down stream. It must be pointed out that the necessary treatment of domestic and industrial wastes cannot be confined to a single community, but must be carried out on the basis of a comprehensive plan to safeguard water supply sources or improve the waterway for everyone. Another objection, frequently made, concerns the appearance of a sewage treatment plant. The general conception is of an ugly structure, in unattractive surroundings, and an atmosphere permeated with foul odors. This erroneous picture can be corrected by illustrations of modern sewage treatment plants, with fine buildings in beautifully landscaped surroundings, more nearly akin to a well kept park or private estate. Some of the illustrations shown here indicate what might be accomplished along these lines.

Continuous public education is required to get the public to fully appreciate the vital service provided by the sewerage and waterworks utilities. Let anything happen to the water supply for even a brief period and the inconvenience causes Mr. Citizen to realize, perhaps for the first time, that he has on tap every moment of the day and night an abundant supply of clear, pure water tested constantly by expert chemists. He has this delivered right to his premises, and to as many places within his premises as he chooses for convenience. He may have a ton of water delivered daily for less than the cost of a bottle of Coca-Cola or a cup of coffee.

After he has used the water, convenient means are provided for its disposal. Let the kitchen sink be stopped up for a day or so and Mrs. Citizen would gladly pay the small monthly or annual sewer service charge, many times over, to have the convenience restored promptly. Here is a simple but practical illustration of the inseparable value of the two utilities—water supply and sewage disposal.

Joint Operation of Water and Sewerage Facilities

For a long time the administration of the waterworks department was kept as separate and distinct from the sewerage department as from the street department. Of the two utilities waterworks was the more efficiently managed because it enjoyed, for the most part, an independent revenue. The sewer department, on the other hand, was operated on a slim budget determined not according to its needs but on what a city council thought could be allowed for that service. On this basis, it was difficult to maintain efficient management. Indeed, it was necessary in some cases to suspend operation for lack of funds.

The imperative need for sewerage improvements made it necessary to seek means for financing construction and operation, and for maintenance of business management. The creation of a separate revenue, in the form of sewer rent, and setting up the sewerage service as a separate utility financed out of earnings, was the solution. The determination of a satisfactory rate schedule is always a difficult problem. For the sewer service charge it is most readily solved by considering the value of the sewer service in proportion to the use of water.

Contrary to early fears that such a basis for sewer service charges would result in lower revenue for water service, through reduced water use, there has been practically no lowering of income to the companion waterworks utility. It is apparent that the joint administration of waterworks and sewerage offers an opportunity to effect substantial economies.

To study the trend in this direction, and to analyze the experiences of those municipalities that had pioneered in this movement, the American Water Works Association formed a committee on the Joint Administration and Collection of Water & Sewer Accounts. The reports of the work so far undertaken by that committee are now a matter of record. It is significant to point out here that the difficulties in joint administration were not as great as anticipated and were of short duration. Objections were overcome as experience developed. The fear that water revenues would be impaired was shown to be unreal.

With the benefit of this experience as a background, no city need hesitate to install a combined administrative system and work out a rate schedule for sewer service that can be based on use of water and billed and collected in the same manner through one office. Such a system will permit full advantage to be taken of the revenue bond method of financing—*an important consideration.*

Landscaped Grounds Beautify Gary, Ind., Sewage Treatment Plant

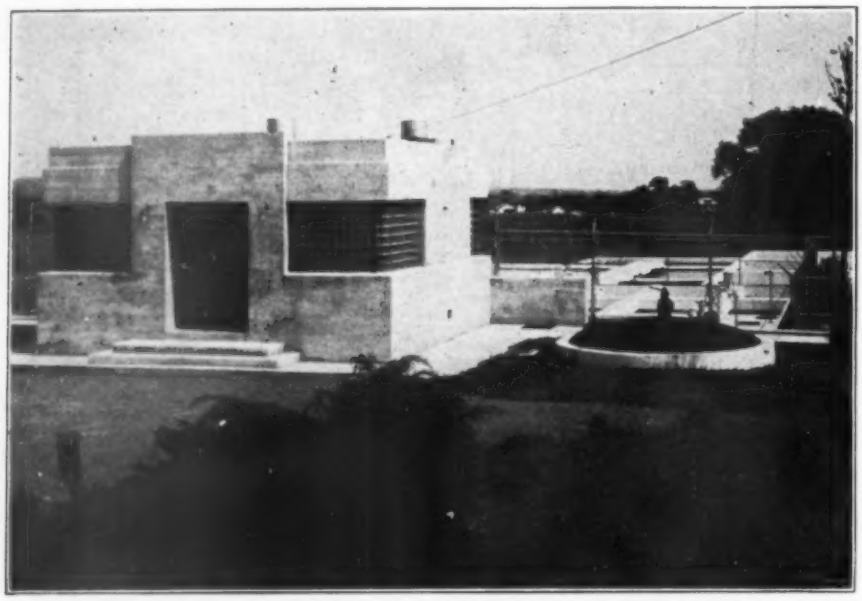
Side-stepping the Municipal Debt Limit

Resistance to increased real estate taxation, and unfavorable experience with special assessments, have caused municipalities to seek other sources of revenue for improvements. Efficiency in municipal government is being eagerly sought. Usually this means business management entirely free and independent of any shadow of interference by politics. To give legal effect to this divorce, a method that has proved successful is the creation of a corporate entity with powers to acquire property, issue bonds and construct, maintain and operate the sewer or water utility from revenues derived from the service. This method has the very significant ad-

vantage of overcoming the obstacle of municipal debt limitations. The obligations of such corporate entity have repeatedly been found by the courts to be independent and no part of the municipal indebtedness.

About the Revenue Bond Method of Financing

Revenue bonds for sewerage improvements, while gaining increased acceptance as sound investments, have not been used to the extent justified by their many advantages. There are several reasons for this. One of the principal obstacles is legislation, of which more will be said later. Another obstacle is the lack of seasoned experience with this form of financing. Often the decision to use revenue bonds is made as a last resort, without adequate time for study by the investment banker or without aid of bond counsel. This is an early mistake to be avoided. There is also some misconception of the ready acceptance of revenue issues by the investors.



Attractive Small Sewage Treatment Plant in Pennsylvania

Some cities, unfortunate in their management or victims of peculiarly unfavorable local conditions, feel that, even though their credit standing is not so good, they should still be able to issue and market revenue bonds. Revenue issues must meet the essential tests for security. This might be simply the old basic formula of three C's: Capital, Capacity and Character. The character of the city and the capacity of the utility to earn sufficient to pay fixed charges and operating costs are the factors that influence the sale and price of the bonds. It is highly important, therefore, that the cities begin at once to put the house in order. Financial support, even should such become available from Washington, may not overcome local handicaps. Obstacles to independent financing of public works should be removed and enabling legislation prepared where necessary.

With particular reference to sewer revenue bonds, there are many conservative bond houses and bond attorneys who are a little apprehensive of the earning capacity. The city must show a good record of its collections for other services, and establish an adequate schedule of rates for sewer service to meet all contingencies. It is better to start off with a high rate, and subsquently reduce it as surplus accumulates, than it is to fix as low a rate as possible and later find it necessary to revise the schedule upwards to meet deficiencies. Delinquencies in any utility acounts should not be allowed to continue. There might normally be a small percentage of delinquent accounts anticipated but, when this shows any tendency to creep up, steps must be taken to enforce payment of overdue accounts.

In a large number of cities revenue has increased, due to wartime activities, and delinquencies in service accounts and in real estate taxes have been less of a problem than previously. It is difficult to offer broad general suggestions for post-war financing but one thing is certain, that cities with a capital surplus will be in a better position to carry on and maintain steady progress than those who have allowed their wartime earnings to be used up or who have prematurely reduced charges for services.

Cities can best safeguard the funds in the treasury by taking action to set aside certain funds for specific purposes, thereby insuring initial capital to commence construction of needed improvements at the appropriate time. Another method suggested by the foregoing remarks is to conserve their debt-incurring power by issuing revenue bonds now, where practicable, while their credit, character and capacity is at the peak. This gives them a chance later to utilize general tax obligation issues or revenue bonds, whichever is best suited at the time. Competent bond counsel can best advise them regarding this point.

It would be a serious omission, in a discussion of this kind, to refrain from mentioning the effect on municipal financing should the tax exemption feature of municipal securities be removed. The constitutional question involved concerning the power of congress to tax municipal bonds will have to be decided by the U. S. Supreme Court. The issue has not yet been squarely presented. When it is, the ruling will be of extreme importance to all states and municipalities.

Should the court take the position that the income from municipal bonds is subject to tax, there would immediately be a substantial increase in the interest rate. This would make such issues less desirable. The income from the revenue producing utility would have to take care of this increased interest charge, leaving less for principal payments. Under such conditions operation would suffer unless the rate schedule be increased, a difficult thing to do without impairing revenue or increasing delinquencies. This is just one more reason for the continuous dissemination of information to the user, and for the constant maintenance of friendly consumer relations.

Opposition to unfavorable legislation, or support of new enabling legislation, can only be asserted with emphasis when backed up by informed public opinion. It will be difficult for public officials, no matter how sincere or vigorous they may be, to obtain necessary legislation unless the members of the legislature know that there is a strong public demand. This does not come spontaneously, except in a crisis. Public support, even in matters of

obvious public welfare, is gained only after painstaking systematic education—sometimes over a long period of time.

An Outline of Procedure

The initiative usually has to be taken by the public official best informed of the needs. With the help of a few loyal supporters, he must organize the effort to be expended in securing public support. The steps he should take in order to do this may vary with individual and the local situation, but generally they may be catalogued in logical sequence as follows:

I. Form a Citizens Committee
- (a) Call for volunteers. (Leading business men, local merchants).
- (b) Appoint a permanent chairman or director.

II. Present the Need for Public Improvements
- (a) Indicate projects.
- (b) Engineers' reports.
- (c) Method of financing.
- (d) Need for enabling legislation. (Suggest outline of a suitable bill.)

III Advertising and Publicity
- (a) Secure cooperation of the press.
- (b) Advertise in community papers —school papers.
- (c) Prepare a printed, illustrated report—(as attractive as funds will permit). Make personal distribution by members of committee insofar as possible.
- (d) Follow up with door-to-door calls by volunteers.
- (e) Secure aid from local clubs, PTA's—schools, etc.

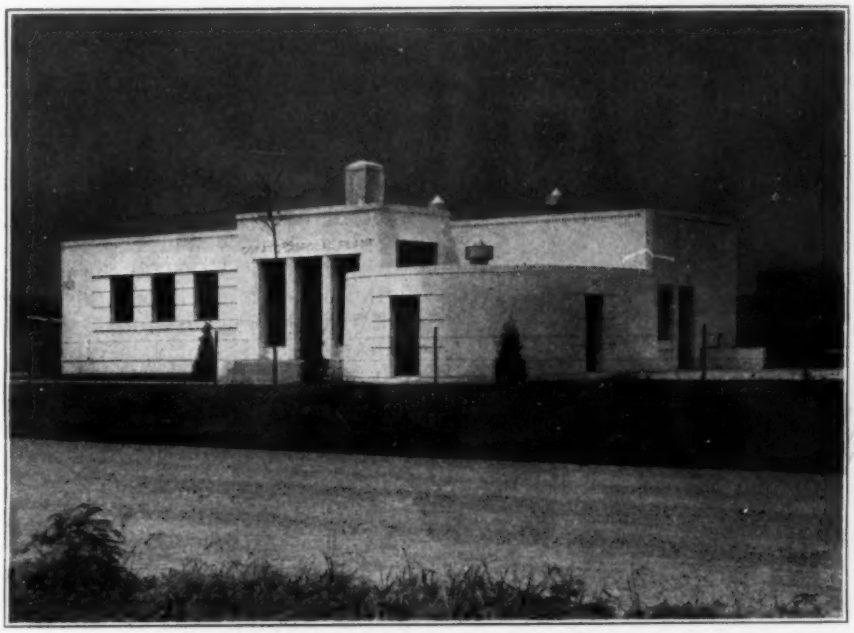
IV. Work of Public Officials
Mayor—Council—Engineers—Attorneys.
- (a) Talks at meetings of local organizations.
- (b) Radio talks where possible. Movies of municipal work—all departments.
- (c) Outside support from National Organizations, Professional Societies.
- (d) Enlist support of other city officials and cooperate in support of common legislation.

V. Have a Proposed Act Submitted to Members of Legislature
- (a) Appoint member of committee to follow bill through legislature.
- (b) Have all organizations, and as many individuals as possible, express their interest in bill and advocate passage.

VI. Final Action
- (a) Have city attorney consult with bond counsel and set up procedure: Ordinance form of bonds, etc.
- (b) Final revision of plans by engineers.
- (c) Complete report to public.
- (d) Periodical progress reports on individual projects.

The above outline contemplates full disclosure of all steps, and continuance of reports to users. Contact with the public should not be lost on completion of a particular project. An excellent example in this connection is Detroit, where an experienced public relations man has been added to the staff of the public works department for the specific purpose of informing the public of the work of that department of the municipal government.

The objective of this article is to arouse interest in a worth-while plan for progressive construction of public works, particularly waterworks and sewerage projects. There is at present a great deal of talk and *superficial* support for so-called post-war plans. We are blind to the real facts if we do not soon realize that there is a serious lag in effectuating plans for improvements. No planning is on a sound basis if we merely contemplate a post-war emergency.



"A House by the Side of the Road"

This neat "house," so different from the sewage plant of a decade ago, was built in 1942 *beside the main road into Cokato, Minn. It serves as an excellent example of inexpensive structural beautification by the use of structural concrete.*

The improvement program should have a more substantial foundation, looking toward a permanent policy of progressive construction of needed public works and operation on a businesslike basis. The key to a successful program is sound financing under adequate legislative authority. Concerted action to bring this about has been too long delayed. To make up for this, work should be commenced immediately in order that any necessary legislative authority may be sought when 43 of the state legislative bodies meet in regular session next year, 42 of them in January and one (Florida) in April. Nor should work be neglected in the other states of Alabama, Kentucky, Louisiana, Mississippi and Virginia, which will not have regular legislative sessions in 1945.

There should be undertaken immediately, in each state, a thorough study of present legislative authority for municipal financing with particular reference to the revenue type of financing. The municipal league within the state, or other organizations representing the interests of all of the municipalities, should secure the advice of competent bond counsel. The study should include inquiry into the extent to which existing legislation has been used, its limitations and proposed amendments. Reasons should be obtained for non-use of existing legislation.

Unless some such action is taken at once valuable time will be lost in getting much needed projects under way, even though the engineer's reports, blueprints and specifications are complete in every detail. The burden of responsibility falls on the public official who is charged with special knowledge of conditions in his locality. He merits and, in the public interest, should receive all the support that state and national organizations can develop by virtue of their influence and various channels for publicity. "Blueprint Now" should be followed by *"Action Now!"*

NEWWA 63RD ANNUAL MEETING CONTINUED

Part II: Supts.' Round Table and Chlorine Dioxide Feature Second Half of Meeting

UNDER the leadership of Sidney S. Anthony, Supt. and Engr. of the Augusta Water District in Augusta, Me., the Superintendents' Round Table, on the last morning of the NEWWA 63rd Annual Meeting, might well be considered one of the features of the meeting.

In addition to the awarding of Twenty-Five Years Service Certificates by Horace L. Clark to thirteen members (see Part I in the October issue), the session heard papers on distribution systems, annuities, and meters as well as a discussion of proposed hydrant specifications.

Chairmen

Sports
"Reg" F. Hayes
Hydratite
Boston, Mass.
(Now in N. Y.)

Supt. Rd. Table
S. S. Anthony
Supt. of Water
Augusta, Me.

Studies of Water Distribution System

This subject was ably presented by Roger Oakman, Supt., Water Division, Pub. Works Dept., Needham, Mass. According to Mr. Oakman, New England towns that have had water systems for the past fifty years or more have found that extensions of the original systems were usually made in short lengths at a time and that these extensions were usually of the same size as the original pipe size. Too many times these hundred-foot extensions grew over a period of years to long lengths of 4-in. or 6-in. pipe lines of 1000 to 5000 feet.

While these lines, for the most part, are inadequate, many superintendents have no time for making the involved Hardy Cross analysis of the distribution system. At the same time, no one should consider the static pressure as adequate information on the condition or capacity of the distribution system. Mr. Oakman recommends fire flow tests.

Just such a survey of the town of Needham was made, and it was found that available flows in the system were quite variable as shown in the following tabulation:

Location	Actual discharge gpm.	Required discharge gpm.
Center of town	4000	2500
Outskirts	920	1500
End of Line A.....	220	1000
End of Line B.....	150	1000

In making any study to correct such conditions, one should remember the relation of pipe sizes one to another as concerns capacity. One should also remember that the pressure loss per 1000 ft. differs not only as to size of pipe but also with different flows. Such considerations rule out the use of 4-in. pipe, and 6-in. pipe should be used only in short lengths and where there are good grid systems.

A new construction, 8-in. pipe should be used where dead-ends and poor grids are likely to exist for some time. Twelve-inch pipe should be used on principal streets, and for long lines not cross-connected at frequent intervals.

In Needham, the problem of poor distribution is being met by studying the trend of new growth, with the possibility of laying pipe lines large enough in new developments to tie in and reinforce weak spots in the present system. Looping of dead-ends is also being done, as is the cleaning of existing pipe.

Consideration is also being given to cleaning and relining some lines, while others are to be replaced with larger pipe. An important part of Mr. Oakman's program is the setting aside of a definite amount of money each year to enable the replacement and improvement program to be accomplished.

The wide interest in this matter of distribution systems was evidenced by the general discussion which followed the paper. Horace Clark, of Sanford, Me., told of finding a four-inch line which would not deliver its capacity, being connected to the main through a ⅝-in. tap and gooseneck.

Sidney Anthony, of Augusta, said that a study of distribution lines indicated that pipe lines laid about 1906 were in good condition, but lines laid between 1929 and 1934 had shown considerable tuberculation, but there was no explanation forthcoming. It was also reported that fire flow tests had showed up both closed and broken valves on the system.

David Moulton, Attorney for the Portland Water District, said that charges for service to small outlying communities should be prorated according to the demand. Mr. Moulton also believes that the fire flow tests should be run for several minutes to actually determine the residual pressure, and that fire flow tests will also indicate the needs that may well become a part of post-war planning.

Superintendents' Round Table

Roger Oakman
Supt. of Water
Needham, Mass.

Fred J. Reny
Gen. Mgr.
Portland, Me.

Roger Esty reported that he, too, had observed that pipe laid prior to 1912 was in good condition but that pipe laid in the 1920s had heavy tuberculation. He also mentioned that, whereas lined pipe costs 8 per cent more than unlined pipe, it costs no more to lay; so that the total cost is increased by much less than 8 per cent when lined pipe is used.

Lloyd Nelson, of the U. S. Pipe and Foundry Co., Philadelphia, pointed out that there are two ways of maintaining the life and capacity of cast iron pipe. One method is to utilize water treatment to produce a water that will not attack the iron pipe or allow the production of tubercles or biological growths that restrict flows. The other method is

Program Participants

John L. Hayden
Cons. Engr.
Boston, Mass.

James R. Gardner
Fed. Wks. Agency
Portland, Me.

John F. Synan
Mathieson Alkali
New York City

Howard Bailey
Cons. Engr.
Boston, Mass.

A. E. Gorman
Water Div., OWU
Washington, D. C.

Gordon Fair
Harvard Univ.
Cambridge, Mass.

to use lined pipe. In addition to tar dipped pipe, it is possible to obtain pipe lined with a thin coat of cement covered with a tar coat. This thin lining may be obtained at no extra charge. A heavier lining of cement may be obtained at an increase in cost as mentioned above.

Annuities for Public Service Employees

According to Fred J. Reny, Gen. Mgr., Portland Water District, pensions were a tradition in other branches of industry long before they were adopted by municipalities for public service employees, and he quoted Webster's definition of a pension as "A payment legally made to any person by way of subsidy, gratuity, etc., or a stated allowance to one retired from service."

Pointing out that the present social security legislation does not include persons employed in municipal public utilities, Mr. Reny emphasized that, in lieu thereof, it behooved municipalities to care for their own until such time as the law is amended to become broader in its application.

With this background, Mr. Reny reviewed the history of the legality of setting up pensions for municipal employees in Maine, and the efforts of the Portland Water District to arrive at a workable pension scheme. In 1927 the Portland Water District installed a group insurance plan, and this has been quite successful from the standpoint of both the district and the employees.

In 1932 two men were retired with a generous allowance, but the danger of this procedure was evident when one of them lived long enough to collect $13,000 over the same number of years.

The cost of group annuities was then investigated, but the plans submitted were too costly. Also considered was a plan for a pension trust, but this was discarded primarily because it was not simple either in its organization or administration.

The final plan adopted was originated by Mr. Reny and his associates. The plan was not only simple but it gives to each employee the same amount of protection he would receive if he were eligible for social security. The plan vested authority in the Board of Trustees, and called for retirement of an employee at the age of 65 or more with the payment of one per cent of his income multiplied by the years of service in order to give him the benefit of past service. Both male and female employees were included in the plan. An annuity fund reserve has been built up by setting aside a book reserve of $6000 each year. The minimum payment for service to any employee, retired for either age or disability, was set at $30 per month. Furthermore, any person retired for disability was given the percentage of his years of service in proportion to what it would have been if he had stayed at work until the age 65.

During the ten years' operation of the plan, study has continuously been made of ways to fund an irrevocable reserve to take care of the annuitants. At present, an accumulation of U. S. Govt. bonds in the amount of $100,000 has been added to the annuity fund reserve.

Mr. Reny said that the ten years' experience with the plan had emphasized the fact that public service employees, as a whole, do not make any provision for retirement, and the pension plan has therefore been of considerable benefit to several persons who had reached the retirement age. Eight men now on the pension list receive amounts of from $7 to $16 per week, at a total cost of $68.59 per week to the district.

In his concluding paragraphs, Mr. Reny pointed out that Portland,

Among Those Present

(1) (2) (3) (4) (5) (6) (7) (8)

(1) *Jack A. Morley, Pittsburgh-Des Moines Steel Co.*

(2) *Alan F. McAlary, Supt., Camden-Rockland, Me.*

(3) *Roswell M. Roper, Supt., East Orange, N. J. (25-year certificate)*

(4) *"Alfalfa Bill" alias Charlie Richardson, Builders-Providence (As he turned up at the costume party)*

(5) *R. Manoon, Supt., Calais*

(6) *Lee P. Sudrabin, Chem. Engr., Electro-Rustproofing Co*

(7) *Matt Alan, Builders-Providence*

Camera Highlights

(1) *Ernest A. Snow, Asst. Engr., Mass. Dept. of Health; C. P. Moat, Ch. Engr., Vermont Health Dept., and Stewart Corburn, Metcalf-Eddy, Engrs., Boston.*

(2) *Gaston G. Tardif, Supt.; A. G. Ro_, Dir., Pub. Wks., and A. Lengelier, Clerk, all of Lewiston, Me.*

(3) *A. E. Griffin of W. & T. discusses a tennis game with Ed "Haile Selasee" Buttenheim and Mrs. "Bill" Foster of American City.*

(4) *Mr. and Mrs. "Gil" Pratt of W. & T., Boston.*

(5) *Goodbye and pleasant memories*

at least, has realized that the expense of taking care of old-timers is recognized as a logical expense to be assumed by the utility.

Building Services and Meters

"Meters are the cash registers of a water utility." So spoke Walter B. Bushway, Supt. Water Dept., Brookline, Mass. By watching the accounts, to observe when water consumption is sliding off, Brookline has been able to keep meters repaired and income at the proper level.

When the accounting department notes that a particular account is decreasing, an inspection slip is made out for that meter and the meter repair department goes into action. This program has resulted in a decrease in water consumption of 60 mil. gal. per year. But more important still is the fact that, at the same time, the revenue has increased from $286,000 to $406,000, an increase of 42 per cent in revenue while the number of consumers increased by only five hundred.

This program began four years ago and has paid tremendous dividends. Meter repairs are all made in a locked meter shop, and the meters are stored in a semi-humid basement. Usual size of meters for a one-inch line is a ⅝-in. meter. If the consumption is over 40,000 gal. per year, a ¾-in. meter is used. When meters have passed 200,000 gallons, they are replaced. During the time a meter is out for repairs, no charge is made for the water consumed, but this loss has not impaired revenue collections and may be considered as advertising.

When there is an argument with a consumer over the size of a water bill, the best argument is a Meter Master record. A 72-hour check will usually convince the most skeptical that the water is actually being consumed. If leaks are found, these are corrected by the householder, after which a ten-day test is run and adjustment is made on that basis. Locking meters has been a big help in preventing water stealing.

Revision of Hydrant Specifications

As Chairman of the Hydrant Specification Committee, Roger Esty said that efforts are being directed toward clarifying sections on operating mechanisms.

Among many of the suggestions made to Mr. Esty for consideration of the committee were the following: Stems should have a torque maximum;——hydrants should be marked with direction arrows to prevent attempts to open them in the wrong direction;——use stronger alloy bronzes for the same size stem;——use a shear pin; and——teach firemen how to open hydrants.

Entertainment

Prestidigitator
Lloyd Nelson
U. S. Pipe Co.
Philadelphia

Singer
"Clint" Inglee
Nat. Water Main Clean Co.
New York

Fall River Industrial Water Supply

Fall River, Mass., is typical of many eastern cities in that, being an industrial city, its water demands increased by many-fold with the advent of war and its accompanying increased industrial production. How this problem was met and solved by the city with the help of Hayden, Harding, and Buchanan, Engrs. of Boston was told by Mr. Hayden, himself.

Increased industrial demand from 15 to 31 mgd. was more than the available supply would accommodate, even if the public water supply were drawn on. It was particularly important, with a drought in progress, that an increased supply be found. Previous studies had been made of another supply nine miles away, and another not so far away but of too small capacity. Neither of these being desirable, a third source was sought and found in Lake Noquochoke, 4½ miles away but having a capacity yield of at least 20 mgd.

With the source located, the problem consisted of constructing a pumping plant and laying a discharge line from the source to the regular water supply. Power was not available in sufficient quantity at Lake Noquochoke, so Diesel engine pumping units were installed and have operated at both low maintenance and operating costs.

Mr. Hayden's paper described the pumping station, its equipment and the construction of the pipe line of 42-inch concrete. This pipe saved considerable in critical steel, but an innovation in design saved even more. "To conserve steel, instead of having a steel cylinder core with wire mesh on either side and concrete grouting all around the frame, the pipe was so designed that the reinforcing was graded; that is, the higher the pressure on the pipe the more reinforcing and, conversely, as the pipe neared the top of the pumping life the reinforcing was reduced." The design proved sound in field tests and saved 120 tons of reinforcing steel.

The cost of the project was shared by the Federal Govt. and the city of Fall River. The total cost was $400,000. Operating costs have been $6.85 per mil. gal. pumped.

At the Net

Mr. and Mrs. Hubert O'Brien, East Orange, N. J.; Edgar Buttenheim, New York City, and Mark Crocker, Newton, Mass.

Army Ordnance Water Supply

Production of explosives for war use usually presents a problem, not only of quantity but of quality. The case of a plant to manufacture the new highly powerful type of explosive was no exception, according to Truman H. Safford, Hydraulic Engr. of Charles T. Main, Inc., Boston, Mass. In this particular instance, there were two plants as well as a loading area and the whole group extended over a wide area. Two pumping stations were required for each plant which required 150 mgd. In addition, there were two filter plants; one of five and one of 12 mgd.

The distribution system was highly complicated, inasmuch as there were high and low pressures, process water, and drinking water lines. Almost every kind of pipe was used except cast iron, which was not available. The pipes included concrete lock joint, and even wood stave. Water for process purposes was of very high quality but was not used for drinking purposes. Mr. Safford's talk was illustrated with slides, showing many of the problems of construction and operation.

Deep Water Submarine Mains

Portland Harbor, with its islands, was the scene of some very interesting construction of water mains laid in very deep water. Five islands were served and wrought iron pipe was laid in trenches dug in the harbor floor. This story was told by James R. Gardner who was, at the time of construction, in the Office of the Regional Director of the FWA in Portland, Me.

Some of the factors which had to be considered, and some of the ingenious methods used, were of particular interest to the audience. Because of the salt water the pipe had to be covered, as a protection against corrosion. In the deeper sections, the pipe was laid from floating derrick lighters by an ingenious method of controlling the angle at which the pipe was discharged into the water. Another ingenious method of handling the pipe was to build up sections of several hundred feet and, with buoys, float the section to the desired location and lower it away by controlling the lines to the buoys. Divers were used to make joints below water. Expansion joints were used because of the wide range of temperature, from 28° to 60° F.

In the deep water, this floating method could not be used and scows and divers were used. One of the problems of excavating the trench was to prevent the twisting of the bucket used in trenching. This was done by a system of heavy counterbalancing weights. As a temporary line in one case, boiler tubes were welded to make one continuous pipe and this served very well. The cost of the whole project was approximately $900,000.

Changing Trends Affect Water Utilities

Arthur E. Gorman, Director of the Water Div. of OWU, spoke on what the change in the war situation, and the expected end to the German phase of the war, would mean to water utilities. Mr. Gorman reviewed the changes in Order U-1 and the administrative letter which was issued on Aug. 31. (Ed. Note: This letter was reviewed and explained at some length in the Oct. issue of *Water Works and Sewerage*, and need not be repeated here.)

Early filling of needs now will insure more prompt delivery of materials after the war; for there will not only be some priorities continued but requests that have been filled will receive attention before materials are dumped on the competitive buyers market. Mr. Gorman said that control could be expected to be relaxed very rapidly after X-day although, naturally, controls will be kept on in the case of materials that are needed to continue the Japanese phase of the war. For example, lumber will continue to be on the controlled list but iron, aluminum, and copper may be expected to be freed within 90 days after X-day.

Mr. Gorman also commented on the inventory situation as regards water utilities in New England. With fewer treatment plants in that section, as might be expected, the inventory on hand was generally higher than in other sections of the country. Of 1100 applications in the three months, New England accounted for only 3½ per cent.

Manpower is still tight according to Mr. Gorman and, if utilities need men over 25 years of age, they should write to the OWU and help will be made available through the U. S. Employment Office. Coal shortages are to be expected during the coming winter, but utilities are allowed to stock a forty-day supply and, if any plant is short of coal supply, it should notify the Water Division.

Chlorine Dioxide— A New Treatment

Speaking of a recent development of the Mathieson Alkali Works, John F. Synan told of the application of chlorine dioxide to water, as a control of taste and odors.

Chlorine dioxide cannot be stored and, therefore, must be generated as it is used. On the other hand, sodium chlorite is stable and can easily be made to release its content of chlorine dioxide when treated with chlorine either as a gas or in solution. For water treatment,

Manufacturers' Representatives

(1) *Ed. Rothman, R. C. Clement and H. S. Hutton of Wallace & Tiernan.*

(2) *H. Seaver Jones, Centreline Corp., and Clinton Inglee, Nat. Water Main Clean. Co.*

(3) *Henry Armbrust, Builders - Province, and Herb Hollberg, % Proportioneers %.*

(4) *Herb Crowell, Rensselaer Valve Co., and Harold P. Morgan, Edson Corp.*

(5) *R. J. Levesque, Omega Machine Co., and Chas. G. Richardson, Builders-Providence.*

this reaction is carried on in water solution.

Chlorine dioxide is a yellow-red gas, highly soluble, and has an oxidizing power 2½ times that of chlorine. It is more effective as a bactericide than is chlorine; but, because it reacts with other oxidizable materials in water before attacking bacteria, more chlorine dioxide is required than chlorine to accomplish the same disinfection. The greater the pollution, the greater the consumption of chlorine dioxide.

The use of chlorine dioxide to destroy odors and tastes in water was tried at Niagara Falls, N. Y., first in a small installation and then as a complete treatment at the main plant. Sodium chlorite is fed with a Wallace and Tiernan hypochlorinator, and to the discharge of this feeder is added chlorine in an amount of 2 parts of chlorine to one part of sodium chlorite.

In order to conserve this relatively costly chemical (75 cents per pound), the chlorine dioxide treatment follows filtration. The water has previously received prechlorination, activated carbon, and alum for coagulation. A residual chlorine of 0.5 ppm. is carried through the filters. The addition of chlorine dioxide is particularly efficacious in the removal of chlor-phenol tastes, which are especially bothersome at that plant. Although sodium chlorite is expensive, the combination of chlorine dioxide with the other chemicals has permitted Niagara Falls to reduce the amounts of chlorine, alum, and activated carbon sufficiently to show an overall substantial saving in chemical costs for treatment, at the same time producing a much more palatable water. At the present time, experiments are being conducted at Bangor, Me.

"Diatomaceous Earth Filtration" by H. E. Hollberg, Vice-President, Proportioneers Inc., Providence, R. I.

Mr. Hollberg's presentation proved to be an interesting movie film in color showing the new high-rate pressure type filter developed by Proportioneers in field operation, being backwashed, etc. The filter employs a diatomaceous earth which is deposited on the surface of submerged porous tubes or plates of "Aloxite" within a pressure cylinder. The filter-aid (in this instance Johns Manville's Celite @ $85.00 per ton) is fed into the applied water in quantity to rapidly produce in the "Aloxite" porous tubes a filter membrane ⅛-in. thick. Coagulated water is then pumped into the pressure vessel to pass through the filtering membrane at rates to meet demands, ranging up to 5 gal./min./sq. ft. of filtering surface with satisfactory results.

The raw water is coagulated with the correct combination of chemicals and clarified by quiescent settling before being pumped through the filter. In the clarification the fill and draw method is employed, thus permitting the operator to secure the most effective coagulation and clarification before any of the water is pumped to the filter. When the filter becomes choked with impurities and floc it is back washed, a new membrane is applied by adding the entire quantity of filter-aid and recirculating the filtrate until complete clarity of effluent is observed.

In reply to questions, Henry Armbrust of Proportioneers (substituting for Mr. Hollberg) said that this filter had been developed as a portable field unit for the armed services, but was now available to contractors, summer hotels, camps and industrial plants. As to its bacterial efficiency, little was known because prechlorination had been used to render the water safe and check any growth of organisms within the filter or the Aloxite tubes. Mr. Armbrust also stated that this high rate filter had handled turbidities up to 200 ppm., and 150 ppm. had been handled even at the high rate of 5 gal/min./sq. ft. of filter tube area. The unit had been operated under various pressures up to 100 lb./sq. in.

"The Water Purification Tablet" by Prof. Gordon M. Fair, Harvard Univ., Cambridge, Mass.

Professor Fair, who lectures with such ease and pith, presented an illuminating discourse on the little pellets developed for use in sterilization of the drinking water supply of field forces of the army, and navy. He said that at first blush the pill method of sterilization seemed very simple, but he dispelled any such idea of simplicity when he recited the lineup of performance specifications which must be met in canteen or Lister Bag sterilization, including good keeping quality, quick disintegration and a diffusion, prompt destruction of organisms on short contact at even the lowest temperatures, no taste production. These constituted the more important of the specifications which had been met in modern field sterilization.

In general the basic composition and reactions of these compounds, known broadly as chloramines, follow—

$$R_2 : NCl + H_2O = R_2 : NH + HOCl.$$
$$R_3 : NCl_2 + H_2O = R_3 : NHCl + HOCl.$$

In each instance the active element is the hypochlorous acid produced. Of these compounds "Halazone" is the oldest and most widely used. To produce 1 mgm. of active chlorine 8 mgm. of tablet is required. This low percent of active element being due to the several ingredients added to bring about the qualities covered in the specifications.

Professor Fair explained that these pellets must be capable of destroying the cysts of the amoebic dysentery producing organism or protozoa so widely met with in the tropics. Likewise it must destroy the anemia producing schistosomes (worms) which are incubated by snails. In tropical and semi-tropical areas these two organisms are extremely important. Fortunately in neutral or slightly acidic solutions 1 ppm. of active residual chlorine will effectively destroy the amoebic cysts and also the anemia producing parasitic blood fluke. In alkaline solutions the results are non-dependable because of suppression of hypochlorous acid liberation.

L. H. Enslow, in complimenting Professor Fair on his splendid discussion, also called attention to some general rules in connection with chlorination. First—it was universally true that at high pH values sterilization and oxidation is markedly suppressed. Second—the likelihood that bad tastes will result from chlorination is far more marked in the use of any alkaline product on the addition of lime given to or simultaneously with the chlorine.

At the evening sessions, on two occasions during the meeting, movie shorts were available to entertain the members and their guests. In addition to selected war films, short subjects, news, and cartoons, the following were presented:

"Winged Scourge"—a Walt Disney film on malaria.

"Design & Construction of a Water Collection & Transmission," courtesy of Johns-Manville Corp.

"Water—Friend or Enemy"—A Walt Disney film through the courtesy of the Coordinator on Inter-American Affairs.

"Victory's Oil"—courtesy of the Barrett Division of Allied Chem. and Dye Corp., New York.—(G.E.S.)

IMPORTANCE OF SEWAGE PLANT OPERATING RECORDS

Experience at Kenosha's "Water Supply Protection Works"

By H. T. RUDGAL
Superintendent
SEWAGE TREATMENT PLANT
KENOSHA, WIS.

GOOD bookkeeping or record keeping is a sound principle and requisite in any business. This principle is also applicable to sewage treatment plants.

Sewage plant records should, and in most cases do, include bookkeeping which shows the dollar and cents side of the operating picture. Other plant operating records and data, however, are also of importance and a necessity in control of operations and furnishing of information which shows how the plant, or particular units of the plant are functioning.

Ordinarily some of the factors which affect the extent and thoroughness of sewage plant record keeping are, type and size of plant, value of the records for plant control, facilities, time and personnel available, and initiative and interest in this form of bookkeeping. In general, the larger plants and those with more involved sewage treatment processes, require and keep more extensive and elaborate records. Many smaller plants and those providing only primary treatment, however, also maintain ample and worthwhile records above the immediate needs of just recording plant operating conditions and results.

The Author

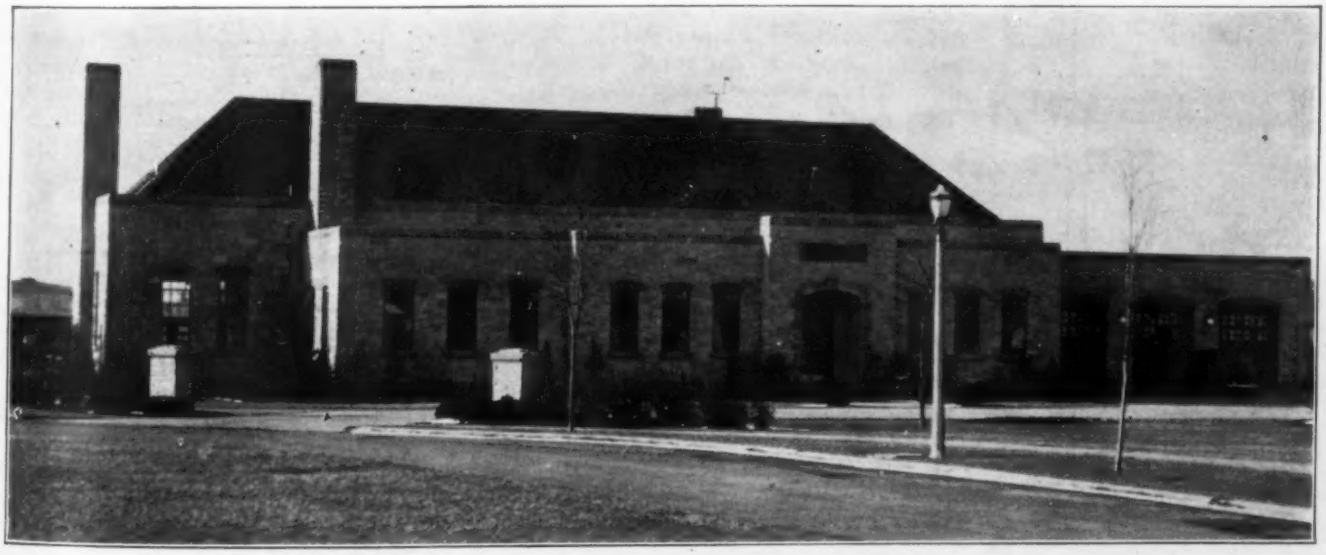
Kenosha's Sewage Plant

Experience at Kenosha has proven the importance of rather complete plant records, so that the value and utilization of some of these operational data will be more fully discussed.

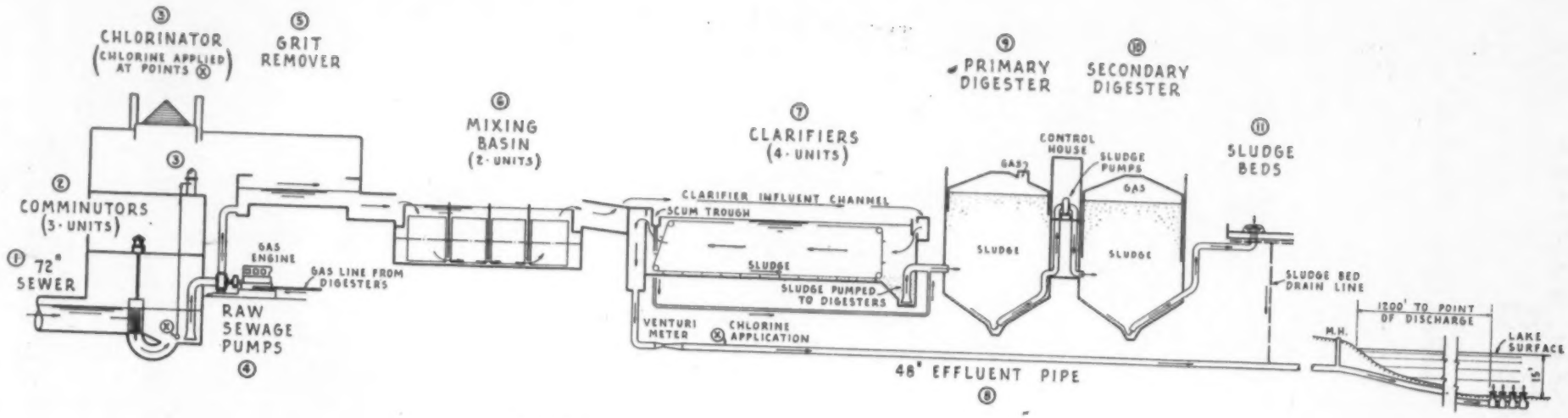
Kenosha is an industrial city of 50,000 population in which three large industries and numerous smaller manufacturing plants are located. The sewage plant (shown in the accompanying photographs and flow sheet) is in the category of a medium sized plant and is designed for primary treatment with separate sludge digestion. Dry weather flow design is for 10 m.g.d., while storm flows up to 36 m.g.d. have been routed through the plant.

Units incorporated in the plant design include three comminutors; three sewage pumps, one electric-motor-driven and two gas-engine-driven. The gas-engine-driven pumps operate as variable speed pumps which allow a pumping range of 2.5 to 12 m.g.d. per unit, and are automatically controlled by float control. Grit removal equipment, two mixing tanks, four clarifiers, two digesters with floating covers, one of which provides facilities for 40,000 cubic feet gas storage, fourteen uncovered sludge drying beds and chlorination equipment are also included in the plant.

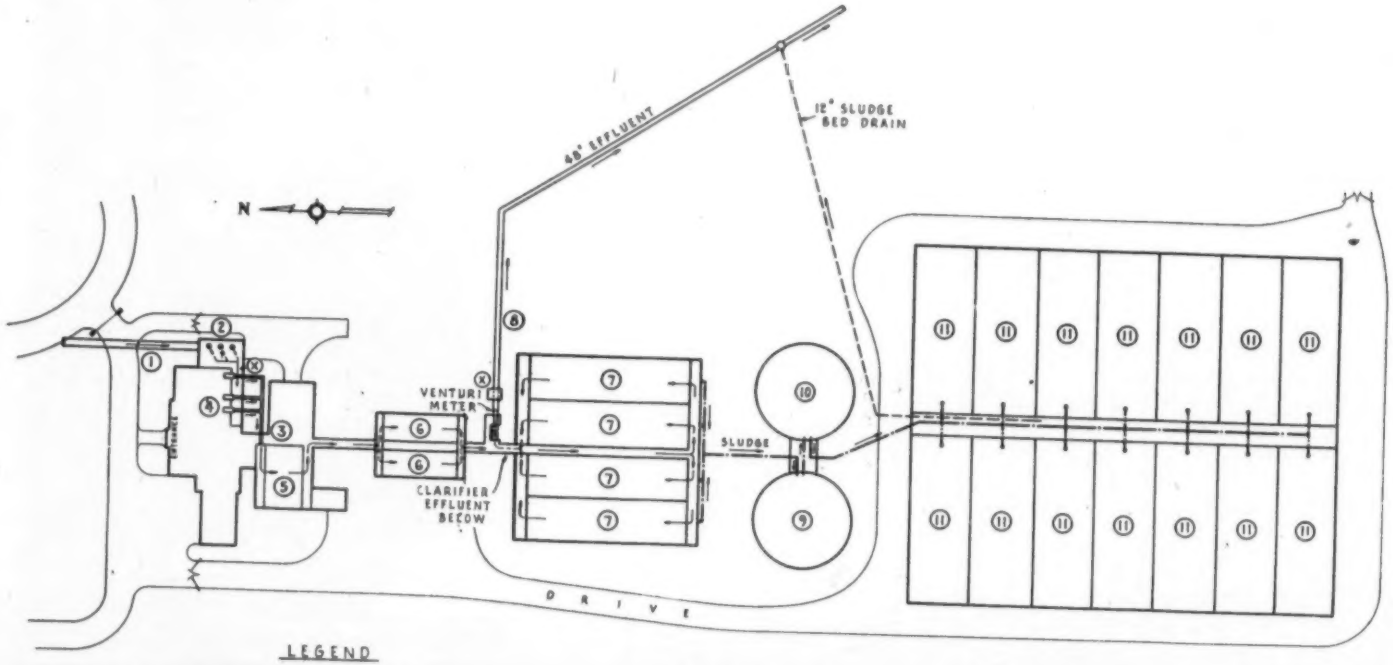
Being completed in 1940, the plant is modern in every respect and embodies auxiliary equipment which has been found to be entirely adequate and which serves to simplify and safeguard operations and control. The plant is located in one of Kenosha's parks and is within 500 feet of a first-class residential district. For this reason the plant grounds are nicely landscaped to be in keeping with the surroundings.



Water Supply Protection Plant, Kenosha, Wis.



DIAGRAMMATIC SECTION



PLAN

FLOW DIAGRAM
KENOSHA TREATMENT PLANT
KENOSHA, WIS.

ALVORD, BURDICK & HOWSON
ENGINEERS CHICAGO

1940

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Incidentally a number of fine homes have been erected in the immediate vicinity, since the plant has been in operation, attesting to the fact that the sewage plant has not been considered a nuisance to the neighborhood.

Operating Troubles and Industrial Waste

Kenosha's sewage treatment plant was placed into operation in August, 1940. Soon thereafter operating troubles developed with respect to sludge digestion. Within two months after the start of plant operations the copper concentration of the digester sludge was found to be in excess of 3000 p.p.m. This copper concentration, together with an excess amount of oil and grease in the digesters, was determined to be the cause of the very poor digestion.

The source of these copper and oily wastes was a brass and copper products industry whose large quantity of rinse waters and pickling wastes contained copper in solution, as copper sulfate. Lime treatment for reduction of the acidity of these wastes was provided for by the industry. This treatment along with the sewage characteristics of the combined domestic and other industrial wastes, set up an ideal condition for precipitation of the copper at the sewage treatment plant. Tests showed that as much as 99.5 per cent of the copper present in the raw sewage was precipitated and removed. This copper would then become concentrated in the raw sludge and later pumped to the digesters.

As a temporary measure, and in order to prove that the copper and oily wastes produced conditions that were toxic and harmful to sludge digestion, the sewer carrying these wastes, along with 35 to 40 per cent of the city's domestic sewage, was bypassed into Lake Michigan so that the treatment plant could be operated without these wastes.

Very satisfactory operating results, including sludge digestion, were obtained after elimination of the brass plant wastes; thereby proving the toxic quality of these wastes, in amounts received, with respect to sludge digestion.

Early in 1943 there was a recurrence of sludge digestion troubles due to excess copper in the digesters. A new brass plant's processing wastes were supposedly routed into the presently bypassed sewer, which carries other such wastes. Investigations revealed the fact that a very large quantity of these wastes was entering the sewerage system contributing to the present treatment plant flow, through a new sewer connection, permit for construction of which had been issued as being for a water overflow line. Rerouting of these wastes eliminated them from the sewage flow reaching the treatment plant and again, in due time, operations returned to normal with satisfactory results.

Litigation

Due to litigation which developed in regard to the copper wastes, they and part of the city's domestic sewage are still bypassed; so that the sewage treatment plant has not provided treatment for 100 per cent of Kenosha's sewage.

After hearings before the Wisconsin State Board of Health and Committee on Stream Pollution, the industry was ordered to so modify and improve their method of disposal of the copper and oily wastes, as to permit all domestic sewage to be treated at the sewage treatment plant. While the order did not so state, a tentatively approved method of disposal of these wastes involved construction and operation of an oil and grease removal plant and a separate sewer line to Lake Michigan.

The industry appealed this order to the Circuit Court and in September, 1943, this court by its decision upheld the order of the Wisconsin Committee on Stream Pollution, thereby denying the industry's complaint. The industry next appealed to the State Supreme Court for a review of the Circuit Court's decision. In March this case reached the State Supreme Court, which recently rendered a decision voiding the order on a technicality of legal procedure. The next step is being considered by the Dept. of Health and Committee on Stream Pollution.

Because of the extended period and stages of litigation, it should be obvious that plant records and miscellaneous data could be and were of great importance in furnishing valuable information for matters pertinent to our toxic industrial waste case.

Importance of Records to Sludge Digestion

Due to the necessity of operation of the plant with only 60 to 65 per cent of Kenosha's sewerage, and the plant being dependent on sludge gas for economy in cost of operation, methods of sludge pumping and gas production control were instituted which deviate from the usual practice.

Fortunately, the present sewage load under normal and average conditions is enough to enable the sewage plant to be self sustaining as to sludge gas required for pumping and heating purposes. This is true, however, only if the raw sludge is rationed or regulated as to the amount that is pumped to the digesters; and being especially so during the cold weather months, when the need for gas is at its maximum.

In order to help insure an adequate gas supply, a careful check is maintained with respect to the sewage solids removed, as per suspended solids, and raw sludge solids pumped to the digesters. With the aid of these data, along with the latest laboratory report of the raw sludge characteristics last pumped to the digesters, the length of sludge pumping periods are computed and scheduled. Sludge pumping, for the past two years, has been entirely controlled from the office, and this system of control found practical and satisfactory.

This practice relieves the operators of responsibility for determining when to stop pumping sludge and has enabled us to maintain a rather uniform quality of sludge together with a regulation of gas production in keeping with plant requirements.

The sludge storage capacity has been computed for the clarifier

TABLE I

Sewage Solids to Sludge Solids Balance: Kenosha Sewage Treatment Plant

Month 1943	Lbs. Solids Removed as per Total Solids	Lbs. Solids Removed as per Susp. Solids	Lbs. Solids Raw Sludge Solids Pumped to Digesters	Cu. Ft. Sludge Gas per Lb. Dry Volatile Solids
January	192,600	180,200	158,300	10.63
February	152,300	128,500	137,500	8.27 (x)
March	100,300	84,100	72,100	5.45 (x)
April	182,600	176,900	162,000	12.95
May	171,800	161,900	169,200	11.04
June	178,600	172,400	173,000	10.42
July	133.500	142,700	136,300	11.70
August	147,800	141,000	154,400	11.55
September	135,800	131,200	129,700	11.43
October	178,600	175,200	163,600	9.95 (y)
November	192,400	170,000	165,800	10.52
December	161,800	163,600	160,900	11.68
1943 Totals	1,928,100	1,827,700	1,782,800	10.55=(Avg.)
1942 Totals	1,745,100	1,676,500	1,732,400	11.35=(Avg.)

(x) = Poor digestion due to heavy copper concentration of digester sludge.
(y) = Start of receipt of all Iron Pickling Wastes from Wire Rope Plant.

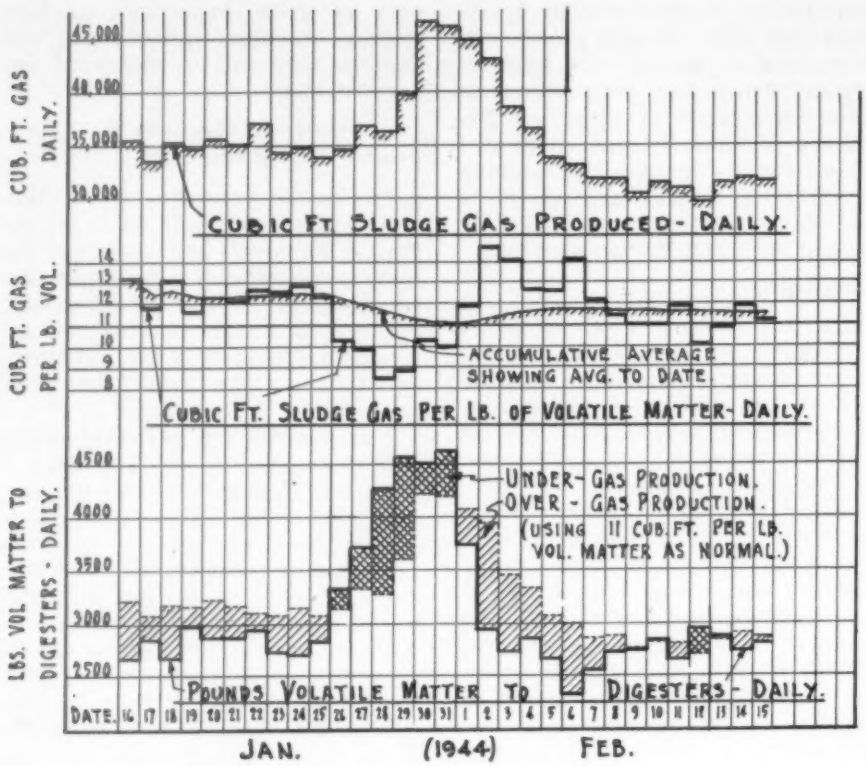

CUB. FT. GAS DAILY.
CUBIC FT. SLUDGE GAS PRODUCED - DAILY.
CUB. FT. GAS PER LB. VOL.
ACCUMULATIVE AVERAGE SHOWING AVG. TO DATE
CUBIC FT. SLUDGE GAS PER LB. OF VOLATILE MATTER - DAILY.
LBS. VOL. MATTER TO DIGESTERS - DAILY.
UNDER - GAS PRODUCTION.
OVER - GAS PRODUCTION.
(USING 11 CUB. FT. PER LB. VOL. MATTER AS NORMAL.)
POUNDS VOLATILE MATTER TO DIGESTERS - DAILY.
DATE.
JAN. (1944) FEB.

Fig. 1—Graphic Record of Sludge Gas Production

sludge hoppers and the clarifier tanks, on a dry solids basis, for various per cents of sludge concentration. Depending on the season of the year, the predetermined minimum amount of raw sludge is kept in storage in the clarifier sludge hopper and tanks. With 5 per cent sludge, the hoppers provide 10,000 lb. storage, dry basis; while with 7 per cent sludge, this figure is 14,000 lb. With at least this amount of raw sludge in storage, enough sludge is on hand to enable us to level out, and make more uniform, the amount of sludge that is pumped to the digester twice daily, irrespective of the great variance from day to day in the quantity of sewage solids settled out in the clarifiers.

Records and graphs are kept up to date, showing the theoretical computed amount of raw sludge in storage and balancing this by the amount of sludge solids pumped to the digesters. This method of sludge pumping control would not be practical or advisable, unless it had been demonstrated that there is a reasonably close agreement or relationship between the computed suspended solids and raw sludge solids quantities.

Sludge upheaval or floating sludge conditions have been non-existent, even at times when the raw sludge in storage has exceeded the sludge hopper capacities. Septic sewage conditions, due to the sludge stored in the clarifiers, have also not developed, as may be attested to by the fact that 5-day B.O.D. reductions during 1943 averaged 52 per cent during months of non-chlorination of the plant effluent and 64 per cent during the months when chlorination was used as part of the treatment process.

Solids Removals Balance

Sewage solids removals during 1943, as per suspended solids records, were very satisfactory, the weighted average being 75.5 per cent for the year. The better than normal primary treatment solids removals are due to certain industrial wastes, such as spent iron pickling liquors and spent carbide wastes, acting as coagulants which help the precipitation of solids.

Table I shows that during 1943 the monthly sewage solids balance is within reasonable limits; while the yearly totals, as total solids, suspended solids and sludge solids, are nearly in agreement. This might be termed, or judged to be, just a coincidence, if it were not for the fact that comparison of the same items of solids, as per 1942 records, also shows a close agreement in these quantities and the three methods of checking on the sewage solids removed at the sewage plant.

Credit for the close check in these quantities must be attributed to good sampling practice and laboratory technique. Samples of raw and effluent sewage are taken each hour, so that 24 individual samples, proportioned in accordance with the flow, make up the composite daily samples. Sludge samples are taken from a 200-gallon composite sample of sludge, made up of samples taken at short intervals during the sludge pumping period. The sludge sampling box, in addition to allowing a large sample of sludge to be taken, also facilitates checking of the pump capacity of the sludge pumps, with the use of a V notch weir installed therein.

Graphic Records

Figure 1 illustrates one method used to graphically record and show the daily relationship of volatile solids loading of the digesters and gas production. This chart clearly presents a daily picture of the digester results and efficiency. The data plotted are actual plant data, which show the lag in gas production during abrupt increased loading of the digesters, with a pick up or increase in gas production above normal, a few days after such heavier sludge pumpages.

It is our practice to record graphically as much plant operating as will serve a useful purpose. Most of the yearly graphical records are plotted on 16-in. x 11-in. graph paper. graduated 366 days, horizontally, by 200 divisions vertical. This enables daily data for an entire year to be plotted on one sheet. The graphs have been found to be useful in helping analyze and ascertain the whys and wherefores of certain operating conditions, especially when a series of related data is plotted on one sheet. Figure 1, Gas Production, is an example of four sets of related figures and quantities being plotted to show an understandable sludge digestion picture.

Figure 2, Sewage Solids Data, illustrates the relationship of computed suspended solids removed and dry solids pumped to the digesters daily.

Weather Records

Yearly weather record charts show the maximum, minimum and daily range of temperatures. This graph is also used to record precipitation. As to weather records, an unofficial weather station is maintained at the plant, since the nearest official station is about 40 miles distant.

A wind vane and anemometer are installed above the highest elevation of the main building and these indicate, electrically, the wind direction and velocity at a reading station located in the boiler room. A rain gauge is installed six feet above ground level, on the roof slab

of the venturi meter room. The gauge is piped directly to a calibrated 1-liter glass cylinder located in the room below the rain gauge. This installation permits precipitation measurements to be made in the "dry," as often as desired or required. During intense rains, readings are taken at short intervals, with the time and gauge reading being recorded on a record sheet, which is always kept at this location. The short interval readings are used to compute rain intensities. This information is of value to the plant, the city's engineering department, and also furnishes weather information for the local newspaper.

One example of the value of weather records was the occasion of our one and only complaint of odors supposed to be emanating from the treatment plant. Since we have prided ourselves on the lack of odors at the plant, it was satisfying to be able to prove, by a check of the wind direction records for the day previous and day of complaint, that the wind direction had steadily held in a direction towards the plant; so that the detected odors were determined to be from other causes.

Miscellaneous Operating Data

In addition to some of the aforementioned records, miscellaneous daily operating data are recorded and compiled as part of the operators' duties. These include two hour period readings of all temperatures, gauges and certain gas meters, four hour records of all gas meters and gas storage tank level, a six hour check for weather data and all water meters and eight hour readings of electrical meters. These data furnish information for a close and frequent check on plant operation, and place a responsibility on the operator in the maintenance of necessary and prescribed operating procedures and conditions. In order to procure the above listed data, it is necessary for the operators to visit all parts of the plant, at least once each two hours, and at such times a check is also made of all equipment.

A summary record of daily data is tabulated on 10 x 50-in. monthly sheets as a tracing, from which prints are made for distribution to supervisory departments and persons interested in this information.

Plant Data Useful to Good Publicity

We have also found plant data useful in the preparation of interesting sewage treatment publicity, which has been used to help educate and convince the local citizenry of the useful and worthwhile function performed by the operation of the sewage treatment plant. Our official plant name, "Water Supply Protection Works," is worthy of mention, as lending itself to such publicity.

A sewage treatment plant, which enjoys and has the good will of the general public, supervisory and governing agencies, usually has less or little trouble at budget time, in having the requested amount of funds approved.

With respect to local publicity, by reports or talks given before various civic groups, it should be remembered that presentation of the sewage treatment plant story will mean much less to the layman, if results are expressed in the common sewage treatment nomenclature; such as parts per million, 5-day B.O.D., or various sludge gas and digestion data. A more understandable and convincing story can be told if these terms are converted to the more common, every-day terminology; such as pounds, tons, or carloads of sewage solids removed or handled, oxygen data as related to the stream or body of water receiving the plant effluent and sludge gas data is especially effective when expressed in the dollar and cents value in reduction of plant operating costs. To help visualize millions or thousands of cubic feet of gas, a better conception of these quantities can be had when these figures are given as gas capable of supplying the average gas needs of a determined number of homes.

At Kenosha, it is our opinion and sewage treatment plant operating experience, that diversified operating records and data are and have been of importance and value in many ways. Our conclusion is, that it is far better to be judged the keeper of too many records than too few.

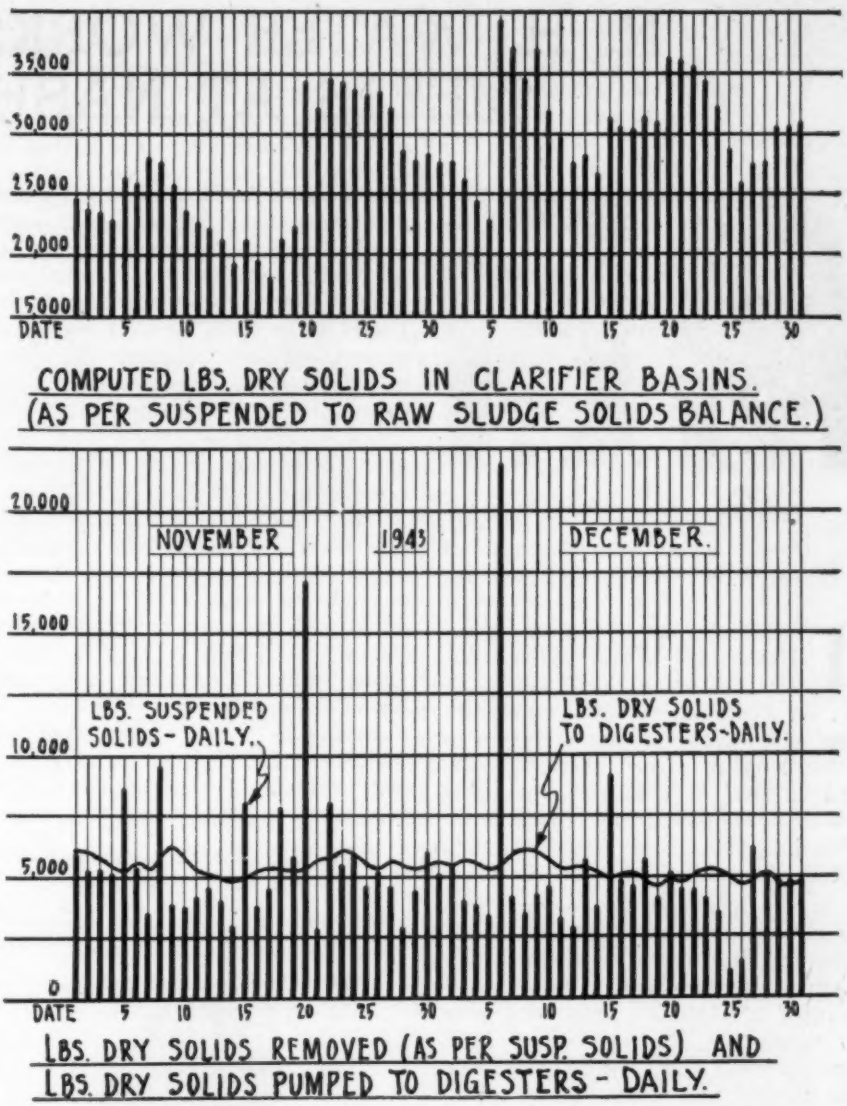


Fig. 2—Relationship of Computed Solids Removed and Dry Solids Pumped

N. H. WATER WORKS ASSN. MEETS AT NASHUA

President
George G. Bean
Manager
Exeter Water Co.
Exeter, N. H.

Secy.-Treas.
Clarence E. Ferry
Engineer
Water Dept.
Manchester, N. H.

THE relatively young New Hampshire Water Works Association met in Nashua, N. H., on Sept. 12, to hear a Laconia sportsman decry stream pollution in a bell-ringing after luncheon talk, and to hear of the fine points and recent developments in "Break-point Chlorination" from W&T's Griffin, a New Englander back home.

In the forenoon the water works "clan" gathered at the reservoir and pumping stations of Nashua's Pennichuck Water Works Co., incorporated in 1853 as a local enterprise to supply the city with water from flowing wells and springs of admirable quality and flow. The water of these springs collecting in a storage reservoir was originally sufficient to supply water-wheel power to pump the entire demands of Nashua and have water to waste besides. Later a more efficient pump and water turbine was installed and is still used to pump as much of the supply, with drive water racewayed down from newer reservoirs farther up stream, as the available supply of power water permits.

As Nashua grew a steam plant was built, and then, in 1908, a larger steam plant. In time the 1908 steam plant was electrified and, still later, the boilers were removed and a Diesel engine installed for standby and peak summer-load service. Today the Diesel is in daily service, and the newest standby equipment consists of twin 3-mgd. centrifugals directly driven by V-12 Lincoln-Zephyr engines, forming an extremely compact installation located in the earliest steam station. Right next door, in the gorge below, is the interesting and expensive custom-built pumping engine and water wheel, constituting a study in water-supply history in which may be compared the plodding "giant" of yesterday with the high-speed "midget" of today, each capable of doing the same duty.

From the water works went the visitors to the Nashua Country Club for luncheon, after which the following papers were presented:

"Break-point Chlorination—What is It, and Why"

Attmore E. Griffin, of Wallace & Tiernan's Dept. of Research and Development, found a highly receptive audience in his discussion of the modern super-chlorination practice known as "break-point chlorination."

Host
Don Calderwood
Chief Engineer
Pennichuck Water Co.
Nashua, N. H.

Starting from the beginning, Griffin defined break-point chlorination as the application of sufficient chlorine to the water to give a residual of true (active) chlorine, as contrasted with a residual of organic chlorine complexes capable of giving a positive test with ortho-tolidine; but also of bad repute in the matter of bad tastes which these compounds impart to waters in many instances.

In the process of break-point chlorination, the so-called "free" ammonia in the water is completely destroyed. However, a break-point or dip in the ascending residual chlorine values of test samples is not essential in order to secure destruction of organic taste-producing chlorine complexes. The problem of determining when such complexes (including chloramines) have been destroyed, and a true active or oxidative chlorine residual exists, is not a difficult one.

The simplest of all procedures is that of adding standard ortho-tolidine reagent to the sample; then a quick mix and an immediate reading. The true residual chlorine value is indicated within a matter of seconds, even in the cold-

Nashua's Water Works Yesterday and Today (1853-1944)

Nashua's first steam operated pumping station. Earlier pumps were water-wheel driven, as is one large unit even today.

Nashua's 1908 steam station, converted into electric and Diesel drive since.

Nashua's Worthington Diesel. Installed for standby service, is now used as primary power source. (Standing by is Dist. Engr. Henry Burpee, Jr.)

Nashua's newest in standby pumping facilities—twin 3 mgd. Worthington centrifugals, direct driven by Lincoln-Zephyr engines, are compact and economical.

Vice-Pres.
Theo. L. Cate
Manager
Laconia Water Co.
Laconia, N. H.

Speaker
Paul H. Kinney
Manager
Coca-Cola Co.
Laconia, N. H.

est water. If the color increases with standing, this increase is produced by chloro-ammonia complexes or similar compounds capable of yielding chlorine slowly in *acid* solution. These possess disinfecting powers, but at very slow rates as compared to true chlorine residuals which appear in almost a flash. From this fact the "Flash Test" derived its name.

The difference between the immediate reading and a 5-minute reading represents the form of residual which must be destroyed if taste prevention, speedy and complete bacterial destruction, oxidation of manganese or iron at any or all pH values, is to be assured. Thereby, the extremely simple "flash test" first proposed by Paul Laux, Sup't of Filtration at Anderson, Ind., constitutes the most certain index of complete chlorination, available to every plant operator equipped for the standard ortho-tolidine test.

Mr. Griffin then outlined the Hallinan-Gilcreas method of differentiating between true chlorine and chloramine residuals, and chlorine and manganese. In brief, ortho-tolidine is added to the sample and immediately thereafter a solution of sodium arsenite. The yellow color read after 1 minute or longer contact for full color development is the true chlorine value. When the arsenite solution is added ahead of the ortho-tolidine, any color developing within 5 minutes or more represents a false residual which is caused by manganese or by nitrates. Therefore the Hallinan-Gilcreas method is the most positive test for differentiating between true chlorine and chloramine residuals, and true chlorine and false residuals caused by manganese or nitrates.

In discussing the effects of alkalinity or acidity on the speed of break-point chlorination, Mr. Griffin stated that, at pH 10, at least 42 hours is required to produce effects secured in two hours or less at a pH of 7. At lower pH values, the speed of oxidation is not much different. The temperature effect is important—the optimum for maximum speed being at 70° F. in practice. At 110° F. the job is done in 5 minutes; whereas, at freezing temperature, 2 hours may be required. As the residual is increased the time for complete chlorination is diminished, at all temperatures.

In outlining some of the more pronounced benefits from high chlorination, in addition to taste correction, Mr. Griffin cited complete manganese removal at low pH values from pre-chlorination at filter plants. Also he pointed out the disappearance of so-called bacterial after-growths in distribution mains, tanks or reservoirs, and the complete eradication of the troublesome gas-formers so resistant to ordinary chlorination. From one plant's records of top of filter samples, he quoted results covering 5 years, to reveal the latter effects and improved rating of the supply in consequence.

Directors

(From left) Chas. W. Easter, Water Supt., Claremont, N. H.; Wm. Healy, San. Engr., N. H. Dept. of Health, Concord; George G. Bean, Supt., Exeter Water Co. (President); Kenneth Gunn, Supt., Univ. of N. H. Water Works, Durham, N. H.; "Ted" L. Cate, Supt., Laconia Water Co. (Vice-Pres.); Clarence E. Ferry, Engr., Manchester Water Dept. (Secy.-Treas.)

In reply to a question, Mr. Griffin stated that it had proved a mistake in break-point chlorination to attempt gradual increasing of the chlorine residuals carried out into the mains via the "creeping up" procedure. Instead, hitting a wallop blow was the safer procedure.

Inspection Group
At the reservoir and pumping stations of the Pennichuck Water Works, serving Nashua since 1853.

Senator and No. 1 Host
One of New Hampshire's newest state senators—Frank Gifford, better known as NEWWA's secretary. Wm. F. Sullivan, Pres., Pennichuck Water Company

Waiting for Chow
On bench: Healy and Jewell, State Dept. of Healh; Harry Stuart, Portsmouth Water Dept., standing. Beyond is Sweeney of U. S. Pipe.

"Polluted Lakes and Streams—A Sportsman's Study"

This was the title on the printed program under which a prominent Laconia citizen and a lover of hunting, fishing and out-of-doors recreation, made an exceptional informal talk on the high cost to the state of pollution entering its lakes and streams. The speaker was Paul H. Kinney, manager of the Coca-Cola Bottling Plant of Laconia, N. H., and former teacher and coach in the Laconia High School.

Mr. Kinney, who is serving as chairman of the Pollution Committee of the Federated Sportsman's Clubs of America, appeared before New Hampshire's water works fraternity to plead for their support, in the efforts of his group and allied groups to recover some of the natural purity of New Hampshire's streams and lakes; to increase property values; render sources of public water supply cleaner; attract more visitors to the state which stood likely to lose more and more of the $6,000,000 now spent each year in New Hampshire on recreation.

Mr. Kinney decried the fact that certain communities and industries were content to ignore human decency, and continue to "dump the results of the day's work" into somebody's water stream. He then proceeded to analyze some of the situations in New Hampshire—"some good, some bad, some just fair"—in his words. These bad situations were costing the state more than realized in lowered realty values and taxes and a gain in bad reputation amongst out-of-state recreationists who contribute so much to the state's economic soundness. He pleaded for more "water treatment in reverse," as he termed sewage treatment and industrial waste purification, as immediate post-war projects without delaying for possible free handouts from Washington should the New Deal be kept in by the vote of November 7th.

Mr. Kinney was highly commended for his speech, which revealed the value of his teaching experience and sincerity of purpose without any of the rabidity or crackpot statements of so many anti-pollutionists.

Percy A. Shaw, Supt. of Water at Manchester, N. H., revealed that the N. H. State Planning Committee's principal effort in the post-war program was to be pollution abatement through sewage treatment.

BUILD YOUR OWN!

Lime Solution Controller*

A. A. BAILEY
Filtration Engineer
BALTIMORE, MD.

UNLESS constantly watched, lime solution is hard to control accurately due to clogging of orifice openings, especially at low flows. The best arrangement we have found for handling milk of lime may be easily and quickly eliminated by opening the valve wide for a second and returning it to its original position. Lime does not have the same tendency to build up in the hose as it does on metal parts.

We have found this arrangement to give control as accurate as obtained with metal valves but with less attention. The only critical material required is about 10 inches of rubber hose.

The Author

is a simple pinch valve made of a piece of rubber hose, preferably sand blast hose. This type of hose is soft but has enough rigidity to hold its shape even under suction.

At the present time we have two of these devices in use. In one, shown in Fig. 1, control is accomplished by a cam pressing against a swinging plate, which in turn flattens the hose to secure the desired opening. The arm which operates the cam, clamps to a quadrant to maintain the desired setting. The quadrant is gradutaed to show the degrees of opening.

In the second device, shown in Fig. 2, control is accomplished by using an old 2½-inch valve bonnet and stem, welded to the framework which supports the hose. The bar that presses against the hose is fastened to the inner end of the stem so that the stem is free to turn. This system gives a better control than the first because a finer adjustment is possible than with the cam and lever.

Any clogging which may occur in the restricted section of the hose

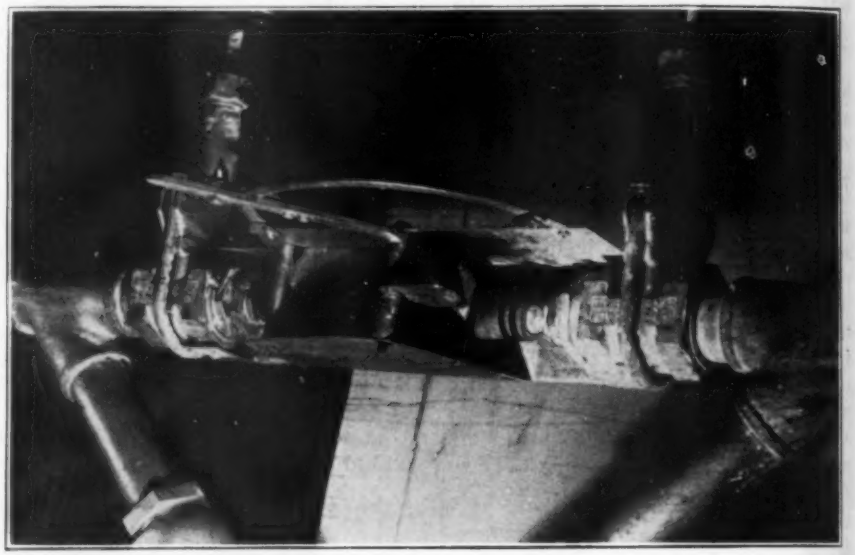


Fig. 1—Lime Solution Feed Control Using Cam and Swinging Plate

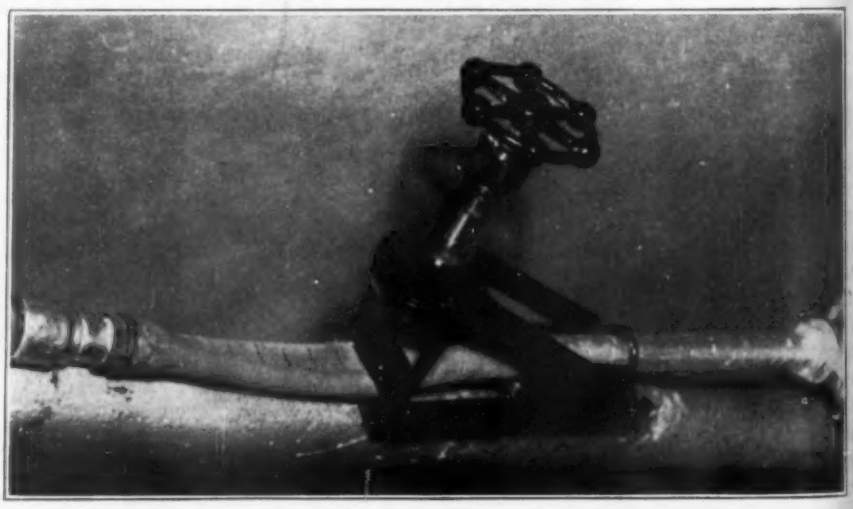


Fig. 2—Lime Solution Feed Control Using Valve Stem and Plate

*Ed. Note: This is the first of several contributions by Mr. Bailey to our "Build Your Own" series.

PENNA. WATER OPERATORS HOLD UNIQUE MEETING

Historic Columbia Water Co. Shows Modernized Plant and Stages Interesting Demonstration of Water Divining. Sessions Held on River Bank Under the Trees

President
H. E. Moses
Chief Engr.
Pa. Dept. of Health
Harrisburg

Secy.-Treas.
I. M. Glace
Cons. Engr.
Harrisburg

AS STATED in our October issue, we regret the necessity of having had to delay the printing of this report on account of our inability to use the additional paper required for this and another meeting report, also delayed.

On August 29th in Columbia, Pa., the Penna. Water Works Operators Ass'n held a unique meeting in which the sessions were held under the trees on the banks of the Susquehanna River at the filtration plant of the 120-year-old Columbia Water Co.

On the evening before, a "Get Together" party was held at Columbia's unique Far East Inn, where, also, all meals were served on the following day which ended with an evening Water Carnival and exhibitions of fancy diving by the Columbia Swimming Ass'n at Twin Oaks Pool. On the morning of the meeting the members had the option of playing golf, at Lancaster's Country Club, or taking a boat trip down the Susquehanna to Safe Harbor Dam. The attendance, including many ladies, was something above 170.

SESSION UNDER THE TREES

The afternoon technical session, held on the river bank under the trees, was opened by a brief address of welcome from Columbia Water Co.'s president, Gen. E. C. Shannon, who highlighted the 120-year history of his company since it was created in 1823 by a Special Act of the Pa. Legislature and ever since has been largely controlled by one family.

"The Columbia Water Co. Plant," by I. M. Glace, Consulting Engr., Harrisburg, Pa.

In his description Mr. Glace told of the modernization of the Columbia Filter Plant, which was installed in 1902 when there were but four filter plants in Pennsylvania. Two of the original tub-type mechanical filters have now been equipped with Palmer "Filter Sweeps," while the other four are still equipped with revolving rakes used for filter bed agitation while washing. Sand has been replaced by "Anthrafilt," and the original wooden tubs have been replaced by concrete construction of tubs with 6-inch walls. An interesting adjunct to the plant is the grit and sand catcher pump in the raw water intake well, and sand-pumps which keep the pump clean. Diesel engines have replaced steam power for continuous pumping. Pre- and post-chlorination is employed, as is also activated carbon and post-ammoniation. Washing demonstrations revealed the effectiveness of the jet-driven Palmer agitators, as against the slow revolving rakes, which have done duty for many years. Turbidity of the Susquehanna runs up to 5,000 ppm. and the hardness runs between 80 and 150 parts.

Host and Family Fair
"Ted" with Mrs. Kain and Miss Nancy

Host
T. H. Kain
Genl. Manager
Columbia Water Co.
Columbia, Pa.

Arranger
L. S. Duckworth
Supt. Filtration
Lancaster, Pa.
(Chmn. Local Comm.)

Following Mr. Glace's talk and plant demonstrations, W. H. Reed, of the Permutit Co., described the compact apparatus developed by his company for converting sea water into a palatable product, and gave a demonstration of its use by our armed forces. The Permutit method of de-

"Here and There" at the Meeting

Demonstration of the art of locating water and mains with the divining rod

Columbia's Far-East Inn where meals were served and the "Get-Together" was held

Columbia Water Co.'s comely Jean Ziegler and Elizabeth O'Brien, assistants to Host and Sec'y

Filter Plant and Pumping Station of Columbia Water Co. which boasts an 120-yr. background (1823-1944)

"Ladies of the Press" came to report the meeting and take pictures for Lancaster and Columbia papers

"Meter-ologists"

J. Fred Keller, Pittsbg.-Equitable, Pittsburgh — *"Jo." A. Hayes, Neptune Meters, Camp Hill, Pa.*

salting sea water has been accepted as the most practical and least combersome scheme of producing palatable water from sea water. In the space provided for but one pint of drinking water formerly supplied fliers and others, the Permutit apparatus and chemical cubes is adequate for producing seven pints of life-sustaining water.

"Chlorine Test Demonstrations" were put on by A. E. Griffin of Wallace and Tiernan Co., assisted by Walter Spencer, Supt. of Water at Merchantville, N. J., and Gordon Wiest of Penna. Salt Co.'s Technical Service Dept.

Elsewhere in this issue is a report covering the meeting of the New Hampshire Water Works Assn. Therein is a digest of a very similar talk by Mr. Griffin, in which the improved methods of testing for residual chlorine are presented and discussed. At the Pennsylvania meeting these methods were demonstrated effectively—in particular the so-called Laux Flash Test and the Ortho-tolidine Arsenite test developed in the laboratories of the N. Y. State Dept. of Health. The latter method consists of adding the Ortho-tolidine reagent and immediately thereafter the arsenite reagent. The "flash" an immediate color development represents the active chlorine only and the arsenite prevents further color development which otherwise the chloromines, and similar chlorine compounds of mild disinfection value will produce. Also was demonstrated the test for detection of interfering substances producing false residual chlorine values; such as manganic compounds or nitrites.

In this test, the arsenite is added *first* and thereafter the ortho-tolidine. The color developed after a contact period of five or more minutes represents the manganese or nitrite effect. Mr. Griffin stated that iron can only produce a false residual after about 30 minutes of contact, and that less than 1 ppm. of nitrite did not interfere. He mentioned other suggested methods, but felt that an operator should not consider any residual chlorine value other than that developing within one minute after ortho-tolidine addition. The arsenite addition was primarily to prevent increasing color development after the flash (10-second) development.

"Meter Maintenance and Testing" was discussed in the Columbia meter-shop, jointly, by J. Fred Keller of Pittsburgh Equitable Meter Co. and J. A. Hayes of Neptune Meter Co.

Mr. Keller's paper is to be published in a future issue because of its thoroughness. Highlights from it include the following. He pointed out that in repairs and maintenance it is not good practice to acid-dip the measuring chamber, but to scrub it with soap and a stiff brush using hot water. The use of a lot of fancy gages in meter repair is not necessary. One set of feeler gages, with points cut down to 1/8-in. in width, is sufficient for checking all clearances necessary. It is a serious mistake to seek clearances bteween disc and chamber wall less than 4/1000 to 5/1000 inch if the water contains any foreign matter, especially silt or sand. Some low-flow accuracy must be sacrified in order to preclude meter sticking.

Demonstrators

A. E. Griffin, Devel. Engr., W. & T. Co., Newark, N. J. (Chlorine Tests) — *"Chet." Sholl, Chief Operator, Columbia Water Co., Columbia, Pa. (Filter Washing)*

The most troublesome part of the chamber seems to be the thrust roller and the wear of the head of roller or slot. Slot lines have not been too successful, and it appears much better to use a reinforced disc to eliminate this trouble. In the case of the piston or oscillating disc type meter, about the same clearances are needed between piston and chamber walls as for disc meters. The clearance is adjusted by the piston roller, which revolves in the center post of the chamber. Piston rollers, available in various diameters, make such fitting refinements possible. In storage, the repaired meter of the oil inclosed gear type should be stored upside down to prevent oil seepage into the measuring chamber. In meter installation, accurate registration and minimum wear can only be secured by setting the unit in exact vertical position.

J. A. Hayes (Neptune Meters) in his part of the discussion on meter testing pointed out the desirability of test by volume rather than weight, and that as many as a dozen

The "Diviner's Quartette"

After careful instructions from Columbia's own Diviner—Fred Grab, who watches intently from left rear—this group of none too adept pupils try their skill with the peach switch. From the left the quartette consists of Herman Louser, City Commissioner of Lebanon, Pa.; "Ted" Moses, the president (seems hell-bent on holding that switch so it won't dip over); "Bill" Schnabel, Director of Water, Allentown; Leon Duckworth, Supt. of Filtration and Pumping at Lancaster. Seemingly, "Bill" Schnabel has struck water. The others seem to have missed the fine points of water divining.

meters could be tested in series at one operation just as accurately as a single meter. As to rates used in testing, Mr. Hayes presented statistics to show that testing at rates above 12 gal./min., through 5/8-in. meters was largely a waste of time. The really important zone is between 1 and 5 gal./min., and the next most important is the household leakage rates of less than 1 quart to 1 gal. per min. He advocated the use of the rate setters in all meter testing. Time was short, and Mr. Hayes was rather brief, so that the water divining demonstration could proceed.

Diviner Grab

On the left Fred Grab, who locates water or water mains with a forked peach switch, is being interrogated by what we take to be a "non-believer," but Diviner Grab double-checked Columbia's record map with his [illegible] switch and both eyes shut.

WATER DIVINING DEMONSTRATION

On the lawn of the Columbia plant a hometown water diviner, Fred Grab, put on a demonstration of the use of the "divining rod" or the peach-switch for locating underground water. Mr. Grab was successful in locating several mains. Thereafter a "Water Divining Party" ensued, in which many members were trying their hand at this little understood art—see pictures.

During the Sessions Under the Trees

(Center picture) Griffin, assisted by Walt. Spencer, Supt. at Merchantsville, N. J., and Gordon Wiest of Pa. Salt's Service Dept., is demonstrating the ortho-tolidine test for residual chlorine; giving the dos and don'ts and explaining the latest improved technique of the test. Second from left we find "Jo" Hayes giving his paper the final once-over—he's next on the program and Charlie Bachmann on his left (also of Neptune) "feels for" poor Jo.

Penn Salt's Research Laboratory Dedicated

If you haven't read the story in Life, or any one of many newspapers, this story of the dedication of the new Whitemarsh Hall Research Laboratories of the Pennsylvania Salt Co. should interest you.

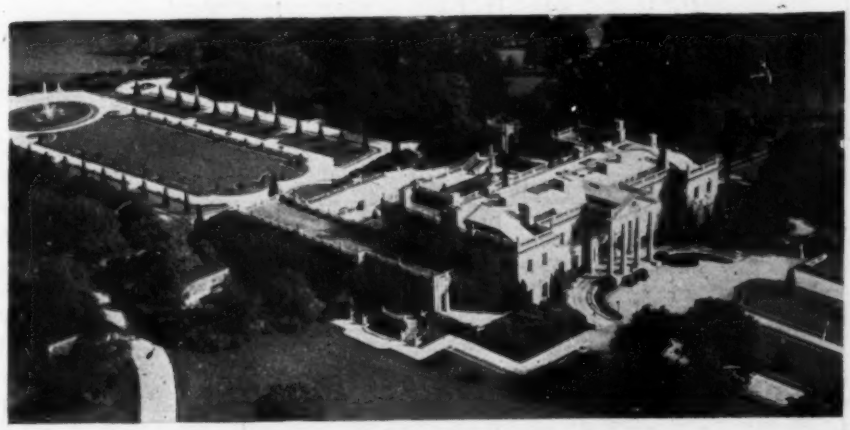
Where once danced the great and near great, the famous and near famous, as the guests of Edward Stotesbury at his wondrous estate at Chestnut Hill near Philadelphia, and where for two years the valuable collection of Metropolitan Museum of Art of New York was hidden to escape possible destruction by enemy bombs, the Pennsylvania Salt Co. has created a modern laboratory without parallel.

Over 500 guests of the company attended the dedication ceremonies on Oct. 4 when Charles F. Kettering, Gen. Manager of the Research Div. of Gen. Motors Corp., was the principal speaker. From his serious comment that research should be regarded as an insurance policy to his humorous comment in tribute to the library facilities, wherein he said that research publications of an organization were more often read by its competitors than by its board of directors, Mr. Kettering paid tribute to the role of a research laboratory and organization in any company.

Originally costing $2,500,000 and requiring three years for construction, the house contains 150 rooms and over 3,500 ft. of halls and corridors. Fireproof, reinforced concrete construction faced with limestone, the building has five floors, two of which are basements.

Several interesting problems of engineering were presented in the conversion of the estate to more utilitarian service, for where once beautiful ladies slept beneath silken canopies, complete laboratory benches now stand, and where once danced many a couple, resplendent with jewels, to the strains of the waltz and fox trot, now stands row on row of reference books in a well stocked library.

Full use of all existing facilities were made, but these were augmented with additional electrical capacity, high pressure steam, and a separate system for the disposal of laboratory wastes. Laboratories will be devoted to research in organic and inorganic chemicals, physical and chemical analyses, electrochemicals, detergents, agricultural chemicals, disinfection and sanitation and many other studies. The beautifully landscaped grounds will be maintained, inasmuch as they are famous for their magnificence, being known as the "Versailles of America." Dr. S. C. Ogburn will be in charge of the laboratories as Manager of Research and Development.



Whitemarsh Laboratories of Pennsylvania Salt Co.

A TEMPORARY HYPO-CHLORINATOR FOR FIVE DOLLARS

By J. R. SNELL
San. Engr.,
Chief, Water and Sanitation Section
HDQT. 1ST SERVICE COMMAND
BOSTON, MASS.

AN INCREASED number of problems requiring chlorination in the treatment of sewage from small Army posts has resulted in the development of an inexpensive temporary gravity hypochlorinator. Several types of constant feed barrel chlorinators have been tried with varying results. A year's experience has proven this type to be superior and easy to assemble. It can be constructed for about five dollars. With moderate care, it gives reliable operation and lasts without repair for over a year. It can be used to feed either sodium or calcium hypochlorite at any rate between 10 and 100 gallons per day and is capable of adequately chlorinating sewage contributed by up to approximately 4,000 persons.

Design and Materials

The constant feed regulator (see accompanying sketch) consists of a simple constant level float, and an orifice which can be raised or lowered to adjust the rate of flow as desired. A swivel arm and clamp are provided to hold the orifice firmly in position.

The float rising against the glass tube keeps the level of chlorine solution at a constant level in the feed regulator and, therefore, the flow through the orifice is constant and is not dependent on the height of the solution in the feeding barrel.

The materials employed in the constant feed regulator can be obtained from almost any chemical or medical supply company, while the feed barrel is a 50-gallon cooper's barrel and can be purchased from any barrel dealer.

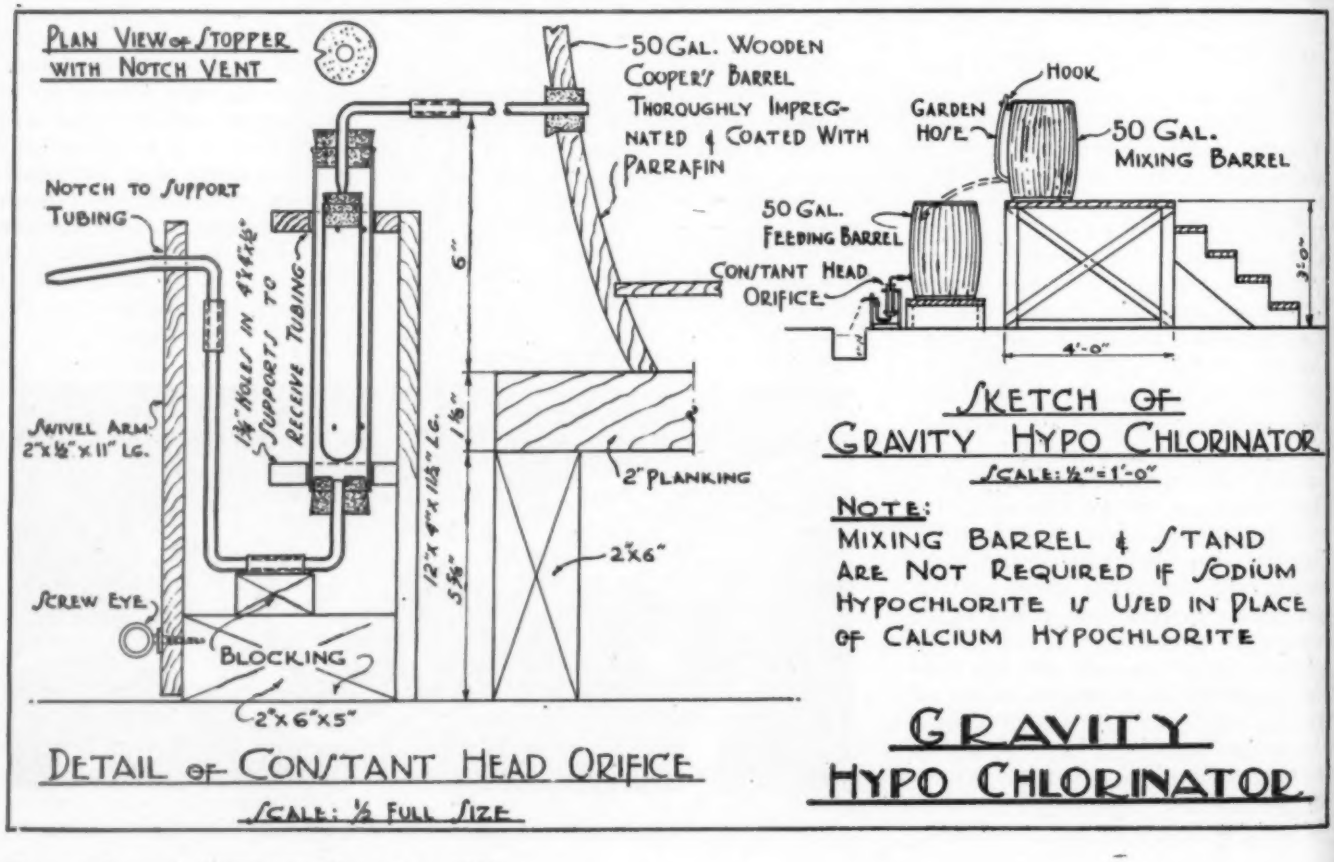
The barrel should be thoroughly impregnated and coated with paraffin to protect it against the highly corrosive chlorine solution. The barrel may last over a year or have to be discarded in less than three months, depending on the thoroughness with which paraffin has been applied. A blowtorch is valuable in the impregnation process, while a paint brush is helpful on the final coating procedure.

If the builder has had any experience in cutting and bending glass tubing, he could buy the required rough materials and do the work himself. However, better results, at very little cost, can be had by getting the work done by a professional glass blower. The apparatus, including all glassware and rubber, (without stand) was made for $1.82 each when a dozen were ordered at one time. The itemized cost of the whole chlorinator is as follows:

Barrel	$2.00
Apparatus	1.80
Supports	1.00
Paraffin	.20
	$5.00

The stoppers used are standard rubber No. 4 and 8. The one on the top of the float has to be rubbed smooth with a fine emery stone, while the large one above this should have a triangular notch cut in its side to act as a vent.

The large soft glass tubing is 37 mm. (1½ in.), while the small soft glass tubing and the neoprene tubing are 8 mm. Neoprene tubing, although more expensive than natural rubber, is much more resistant to



the corrosive action of chlorine. The test tube is a standard 6 x 1-in. diameter and has three 3/16-in. glass projections, fused on top and bottom to act as a guide and prevent sticking. The openings in the orifice, and the opening above the float, should be drawn out to about 2 and 4 mm. in diameter respectively. The latter must be ground flat with a fine emery stone to insure positive closure against the float stopper. The correct measurements for the length of tubing and bends can be obtained by scaling from the sketch. The support shown can be built from scrap lumber in a few minutes.

Assembly, Location, and Operation

It is important that the float assembly be kept vertical. The rubber stoppers must be pushed in firmly and evenly or the float, on rising, will not produce satisfactory closure. If it is not indoors, it should be further protected by building a box for it. The solution water supply must be clean and free from foreign matter which may clog the apparatus.

Should calcium hypochlorite be employed in place of sodium hypochlorite, a second cooper's barrel is required for mixing. If this precaution is not taken, sludge or scum will soon clog the apparatus. A three-foot-high support for this mixing barrel facilitates operation. The quantity of calcium hypochlorite should be measured out daily, stirred into the barrel full of water for ten minutes, and then allowed to settle for at least two hours before being drawn over into the feeding barrel. Accumulating scum and sludge has no chlorine value and should be cleaned out of the mixing barrel periodically, and never allowed to be present in the feeding barrel.

The rate of flow can be adjusted from 10 to 100 gal. per day by adjusting the height of the orifice by rotating it sidewise. It is recommended that the flow be set and maintained at 30 gal. per 24 hours. This is equal to ½ pint (8 fluid oz.) in three minutes. The quantity of chlorine dosed had best be adjusted by varying the strength of the solution.

In using Calcium Hypochlorite, difficulty may be had if solutions stronger than 1 per cent are used; but Sodium Hypochlorite may be used at any strength up to that provided by the manufacturer, which is generally 10, 12½ or 14 per cent.

Chlorine Test Outfit

A simple residual chlorine test outfit can be made from several 1-ounce square bottles. Permanent standards, representing desired strength of residual chlorine, may readily be made by use of appropriate quantities of copper sulphate and potassium dichromate solutions. A close approximation of the strength of each solution required can be obtained from Standard Methods of Water and Sewage Analysis (8th Edition) by the U. S. Public Health Association. The exact quantities of these solutions required depend upon the size and shape of the bottle, but can be determined rather quickly by trial and error when comparing the solutions to a commercial comparator set. These standards should be kept in the dark when not actually in use.

Industrial Waste Utilization Conference

Purdue University, Nov. 29-30

Under the direction of the Dept. of San. Engr. of the School of Civil Engineering of Purdue University, and with the cooperation of many state agencies and business and industrial associations, a Conference on Industrial Waste Utilization will be held on Nov. 29-30 at the University in Lafayette, Ind.

From information furnished by Don E. Bloodgood, Assoc. Prof. of San. Engr., the following tentative program has been scheduled:

Milk Wastes.....Dr. H. A. Trebler
Packing House Waste..R. E. Bragstad
History and Legal Background of Stream Pollution in Indiana.....James A. Emmert
Utilization and Disposal of Industrial Wastes.Dr. F. W. Mohlman
Metal Recovery.....Wm. S. Wise
Sewage Treatment and Industrial Wastes.Prof. Don E. Bloodgood
Brewery Wastes...Dr. Willem Rudolfs
Feed By-Products from Grain Alcohol and Whiskey Production.....Dr. C. S. Boruff
Petroleum Waste Utilization.....Roy F. Weston
Food Canning Waste....L. F. Warrick
Industrial Wastes and Fish Life.....Dr. M. M. Ellis
Mine Waste and Steel Mill Waste.....Prof. W. W. Hodge
Industrial Waste and Stream Pollution.....Joe L. Quinn

Also scheduled are sub-meetings on these several wastes and efforts are being made to obtain as discussors of the papers various other outstanding workers in these and other industrial wastes. Talks are also scheduled by R. B. Wiley, Dean of the Engineering School, and Governor Scheckler of Indiana.

Cooperating with the University in this enterprise are the following organizations:

Indiana Stream Pollution Control Board
Indiana State Board of Health
Indiana Conservation Department
Indiana State Chamber of Commerce
Indiana Manufacturers' Association
Indiana Canners Association
Indiana Milk and Cream Improvement Assoc.
Indiana Coal Operators Assoc.
Indiana Coal Producers Assoc.
Indiana Truck Mine Operators Assoc.
Indiana Brewers Assoc.
Indiana Oil and Gas Assoc.

Out of state persons interested in these problems are invited to attend. Write to Prof. Don E. Bloodgood for reservations at the Purdue University Union Building.

This somewhat unique departure from the ordinary type of technical meeting seems like an excellent start on the part of Purdue University and the State of Indiana to bring about understanding and cooperation of industry in the problem of stream pollution abatement.

Stepleton Joins Browne and Associates

Harold A. Stepleton, Consulting Sanitary Engineer of Toledo, recently completed eighteen months' work with the Engineering Faculty of the University of Toledo, where he was in charge of the Physics Laboratory during the Air Cadet Training period. Mr. Stepleton is now a member of the staff of Floyd G. Browne and Associates, Marion, Ohio, Consulting Sanitary Engineers on water supply, sewage and industrial waste treatment.

Blueprint Now in Action!

From information collected by the ASCE Committee on Post-War Construction, it appears that construction projects already planned contains a fair share of water and sewerage projects. In six months, from April 1 to Sept. 30, plans for water works and sewerage have more than doubled in dollar value. Where six months ago water and sewerage projects accounted for only 11.7 per cent of the total plans at that time, they now account for 17.8 per cent of the total construction planned.

Of the total water works plans ($260,948,000), approximately 89 per cent come from 13 states and 82 per cent of the total sewerage plans ($519,764,000) are from seven states, thus indicating plenty of room for further increase.

According to Mark B. Owen, Director of the committee, sewerage projects continue to show the greatest gains in the volume of plans in the design stage, indicating a large back-log of needed work in this category.

Comments of the Editors

Don't Be a Scrambler

CONCERNING things to come, as the winds now blow, we may expect further easing of limitation orders and restrictions by the War Production Board on uses of metals and other hitherto critical materials in the production of civilian goods. In fact, it would not be a great surprise to hear at any time now that all but a very few of the remaining protective limitation orders and restrictions on uses of copper, aluminum, copper alloys and steels for civilian goods had been completely removed by the W.P.B.

Of course we believe that such a thing would prove highly undesirable, and is something that water works and sewerage men would feel the effects of rather severely because they have not gotten prepared for a lifting of the priorities protection given them. In many instances the sudden loss of priority protection might prove almost disastrous, and certainly embarrassing, to a large number. As indicated from records of the Office of War Utilities (and confirmed in our observations), by and large the stocks of maintenance, replacement and new service materials and parts are now at the lowest point perhaps in the history of water and sewage works from coast to coast.

Now, if suddenly all restrictions on the supplying of copper, bronzes, steel, etc., for production of civilian goods should be lifted at this stage of depleted inventories of equipment and materials in the water supply and sewerage field, and all preference orders and priority protection now enjoyed by essential civilian enterprise be dropped, nothing short of a mad scramble would ensue. Without the priority ratings presently enjoyed by the water works and sewerage utilities, the manufacturer or fabricator would have no prior claim on supplies of raw materials going into the production of water and sewage works equipment and parts. In consequence our manufacturers would find it necessary, in securing raw materials and stocks for fabricating, to compete with those producing less essential civilian goods. So, the procurement scramble would be on all down the line from the mines and mills to the ultimate user. The manufacturer would no longer have legitimate reason to favor one purchaser over any other, and the rule of "first come first served" would become the order of the day. Thus, we foresee the possibility of one grand scramble for materials and equipment which have so long been denied the general civilian market, and for which there has accumulated such a back-log demand, and potential competition in procurement, at the first signs of withdrawal of priorities and preferential allocations.

It is this possibility which has prompted Arthur E. Gorman, Director of the Water Division of W.P.B. and members of his staff, in recent speeches before water and sewage works groups, to forewarn managers of these essential utilities and to advocate the prompt placement of orders for materials and equipment which may be needed for sometime ahead. The point is this—the water and sewage works manager still enjoys a priority rating and orders now placed which carry the permissible rating will enjoy such priority in respect to time of placement, as well as making it possible for the supplier in turn to get the required materials into his shop ahead of the foreseen scramble at the time of the dropping of priorities or the further general easing of restrictions and limitations on free usage of critical materials.

Although no one can predict with any certainty what is going to be the history of costs of materials and production, the best guesses at present point to some increases in labor and materials costs with the successful prosecution of the war. Be that as it may, there seems little likelihood that prices will be lower at any time in the near future, so there can be no expectation of economy in further delaying replenishment of depleted inventories. On the other hand delay may prove a losing procedure money-wise, but more particularly should further delay be avoided as a matter of inventory protection and as an aid to the supplier.

We wish to emphasize the belief of those who should know, that although the future will see raw materials and stocks statistically plentiful for civilian goods, the distribution and the scramble will make many of these things hard to get for some time after the lifting of restrictions.

So we will close with the plea—Place your orders now, and "Avoid being a scrambler."

Keep the Place Spruced Up!

"CLOTHES don't make the man," says the copy book. Perhaps not, but they do reflect his attitude toward cleanliness and neatness. He who is neat and clean sells himself to others as one who not only cares, but who also is apt to be neat and orderly in his thinking and his work.

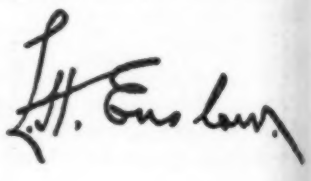
Try the same idea in your sewage treatment plant. Spruce it up a bit. It will help you sell your plant to your community. A clean, neat treatment works will also help sell your ideas to your board when you ask for improvements, additions, replacements, or for catching up some long-deferred maintenance.

In the September issue, on this page, Mr. Enslow presented a case for plant beautification, saying, "the attractive package not only sells the product but also the producer," and he added that many sewage plants were putting water plants to shame in attractive buildings. But Mr. Enslow didn't say that, too often, the attractive package isn't kept that way.

Plants which are not maintained properly soon lose the interest of both the governing body and the townspeople. But, we repeat, "keep the place spruced up" and see how much easier it is to sell your future needs to your board and your citizens.

Don't take our word for it. Listen to two men on the opposite ends of the relation between the sewage plant and the governing body. In this issue, H. T. Rudgal, in his article, "Importance of Sewage Plant Operating Records," gives the viewpoint of the man who operates the plant. In the July issue of *Water Works and Sewerage*, Mayor Frank E. Livermore, of Ridgeway, N. J., gave the viewpoint of the head of the governing body.

Do they disagree? Not at all. What they both say is, "If you want to sell your plant to your city and keep it sold, 'Keep the place spruced up'."—(G. E. S.)



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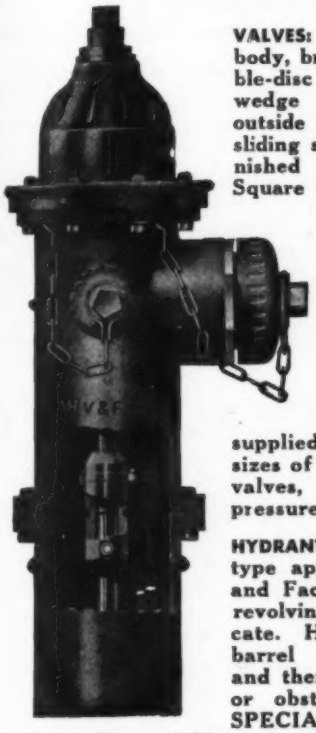

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Have you requested your copies of the Hooker "Liquid Chlorine Booklet"? It contains helpful information on this chemical, physical and chemical properties, its uses, and, of particular value to new employees, precautions for handling, storing and transporting. Copies are free when requested on your letterhead.

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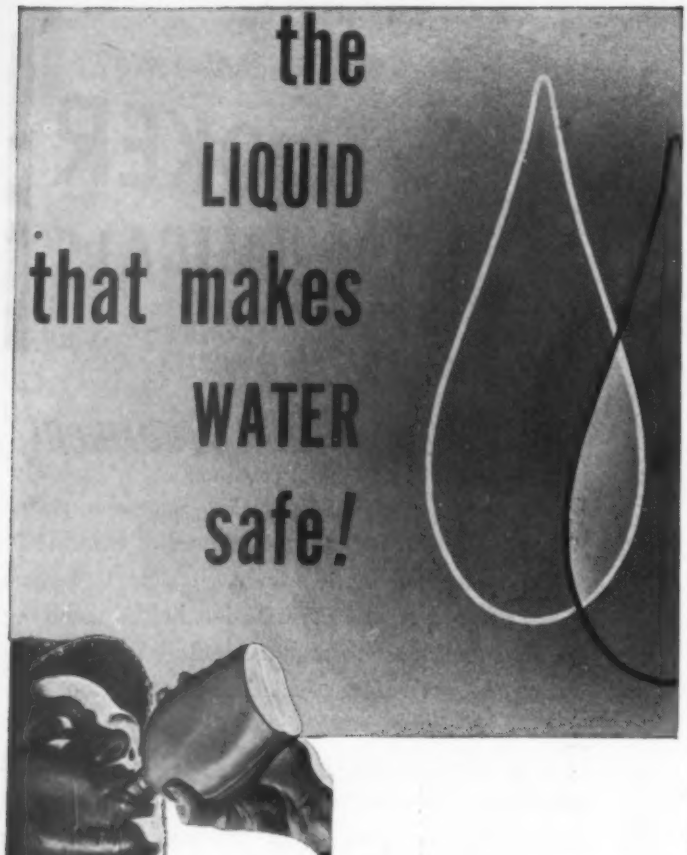

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MEETINGS SCHEDULED:

Nov. 14-15—RICHMOND, VA. (John Marshall Hotel).
Virginia Section A.W.W.A. Secretary, W. H. Shewbridge, 119 State Office Bldg., Richmond, Va.

Nov. 14-15—WATERTOWN, S. D. (Lincoln Hotel).
South Dakota Water & Sewage Works Conference. Sec'y-Treas., Glen J. Hopkins, State Board of Health, Pierre, S. D.
(This meeting, previously listed for Sept. 19-20 has been postponed to above date.)

Nov. 16-18—ST. PETERSBURG, FLA. (Swannee Hotel).
Florida Section A.W.W.A. Sec'y-Treas., Prof. A. P. Black, University of Florida, Gainesville, Fla.

Nov. 20-22—OKLAHOMA CITY, OKLA. (Municipal Water Treatment Plant).
Oklahoma Short School for Water Works Operators. Sec'y-Treas., H. J. Darcy, State Sanitary Engr., Oklahoma City, Okla.

Nov. 29-30—LAFAYETTE, IND. (Purdue Union).
Industrial Waste Utilization Conference. Chairman, Prof. Don E. Bloodgood, Purdue University, Lafayette, Ind.

Sections Not Holding Fall Meetings
Kentucky-Tennessee Section A.W.W.A.
*Missouri Valley Section A.W.W.A.
New York Section A.W.W.A.
North Carolina Section A.W.W.A.
Pennsylvania Water Works Association.
*Western Pennsylvania Section A.W.W.A.
Wisconsin Section A.W.W.A.

*Previously listed but cancelled.

Jan. 17-1945—NEW YORK, N. Y. (Pennsylvania Hotel)
New York Section A.W.W.A. Mid-Winter Luncheon Meeting. Secretary, R. K. Blanchard, 50 West 50th Street, New York, N. Y.

Mar. 9-10—MINNEAPOLIS, MINN. (Nicollet Hotel).
Minnesota Section A.W.W.A. Sec'y-Treas., R. M. Finch, 416 Flour Exchange, Minneapolis, Minn.

Mar. 21-23—TORONTO, ONT.
Canadian Section A.W.W.A. Sec'y-Treas., Dr. A. E. Berry, Ontario Dept. of Health, Parliament Bldgs., Toronto, Ont.

Apr. 26-27—ELMIRA, N. Y. (Mark Twain Hotel).
New York Section A.W.W.A. Sec'y-Treas., R. K. Blanchard, 50 West 50th Street, New York, N. Y.

Here and There with Doc Symons

WE always thought a "B" and "B" was an after dinner liqueur, but now we learn that it is a boat, a 31-ft. Chris Craf, belonging to *Boyd Anderson Bennett*, Pres. of Water Utilities Service Corporation.

* * *

From the **O-B** of the No. Dak. Water and Sewage Works Conf. (Editor, Ken Lauster) comes this gem:—"Inscription on a water tank at Emory University—'It was founded and organized by our beloved President, John Billings; Born 1815, Died 1870; Capacity 150,000 gallons.'"

* * *

We should have told this one before. Ted Rimback, of Permutit, was explaining the installation of one of their Spiractors in Teutopolis. Seems as though the entire bond issue for the plant was purchased by the citizens of the village which has 1600 residents. And when they wanted to retire some of the bonds, the people wouldn't give them up. Who says a good water supply cannot be a good investment.

* * *

Election time reminds us of the story about Jim Brown, of the National Water Main Cleaning Co. At the Illinois Section meeting last April, it was observed that Jim was inviting quite a number of persons down to the bar with him for a drink. Either he wasn't drinking or he had a tremendous capacity, so we stuck around to see what went on. Sure enough we were invited, and went. But on arrival we found this note on the door, "Primary Day, Bar Closed." "Oh, Shucks," said Jim, "Well, here we can go across to the drug store and have a coke."—we weren't the last sucker to bite on the gag either.

* * *

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A Royer User Speaks For Us!

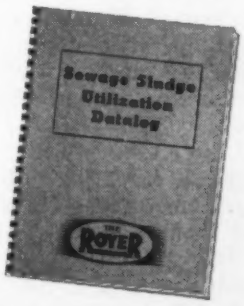
How the Royer Sludge Disintegrator justifies itself from an economic standpoint is told in the following report from Mr. S. J. Williams, Superintendent, Board of Public Works, Menominee, Michigan:

"We consider our Royer Sludge Disintegrator a very good investment. It has paid for itself, and has shown us a net profit of $500 during the past two years.

"We sell all of the sludge we can produce at $5.00 per ton, and in smaller quantities the price runs as high as $8.00 per ton. Customers do their own hauling and bring their own containers. The biggest portion of our sludge is ground by those who wish to work out their water accounts. This works to a very good advantage to the Water Department, as well as to the customer. We are well satisfied with our investment."

An ever-growing number of sewage disposal plants are converting their sludge cake into valuable and marketable fertilizer with Royers. The labor involved is less than that required to bury or incinerate the sludge. Incidentally, these sewage plants are aiding America's war effort by helping increase food production. Most of the Royer-prepared sludge is used for food crops by commercial growers and Victory gardeners.

The Royer is available in twelve stationary and portable models; electric motor, gasoline engine and belt-to-tractor driven. There's a size and type for every sewage plant.



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These 5 new features assure longer life, increased efficiency
1. Double Helical Pumping and Timing Gears: Eliminate hydraulic thrust and assure smooth, quiet operation at relatively high speeds.
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5. Accessible and Interchangeable Parts: All parts easily removed from casing. Parts machined to close tolerances.
QUIMBY PUMPS
QUIMBY PUMP Division

many a mile last year (from Here to There) none other than E. L. "Blueprint Now" Filby has sent us newspaper clippings reporting two sewage plant explosions, within a week at widely separated plants. One at Somerset, Ky., the other at Monroe, Mich. The latter damage was so great as to require bypassing of the sewage "probably for several months." And only three months ago we recommended, in this column, the report of the Ohio Dept. of Health on "Sewer Gas Hazards." Now, before your plant blows up we suggest you obtain the "Manual on Safety" soon to be released by the Federation of Sewage Works Assns.

You won't believe it, but at the Federation of Sewage Works Assns. in Pittsburgh, Bill Piatt of Durham, N. C., and Charlie Emerson of New York were drinking Guernsey Milk.

* * *

Repercussions of the 1942 *Federation Meeting.* Some of our readers may remember that, at the Cleveland Meeting in 1942 of the FSWA, we wrote the Federation Daily. One of the items was titled "Around the Beer Barrel" and mentioned a number of persons seen at the Pre-convention Get-Together; one of whom was Van P. Enloe of Atlanta. Our little publication somehow reached the homefolks who don't approve, and Van is still called "The Beer Sop" within the family circle. Now this is to inform those interested that, at the 1944 Pittsburgh meeting, Van wasn't near the Beer Keg. —No Beer Keg!

* * *

When, with much ceremony, Tom Camp was awarded the Dexter Bracket Medal at the NEWWA meeting he was a bit surprised to open the box and find therein only a leather tie clasp. The Medal hadn't arrived in time. Copies of W.W.&S. were also a casualty of transportation at that meeting.

* * *

It was Henry Rath, of Tallmans Island, L. I., who observed from the registration list at the FSWA in Pittsburgh that the man farthest from home was a Mr. Max S. Campbell of Seattle, Washington, and the man nearest home was Mr. T. J. Campbell of Pittsburgh. There was also an E. M. Campbell from Pittsburgh.

* * *

Where is our wandering boy? Lt. Col. J. C. "Monk" Hanes resigned as Chairman of the Virginia Section, AWWA, when he was assigned to the Institute of Inter-American affairs with headquarters in Mexico City - - - Jim Rumsey (the Old Maestro of Michigan) flits around the state helping Milt Adams with the post-war plans of the Mich. Stream Control Comm. - - - Harold Kurtz, once of Butler, Pa., and lately a San. Engr. with the 4th Corps Area, U. S. Engrs., has joined Chain Belt as a San. Engr. - - - Bodie Ketchum is still in Buffalo - - - Sam Zack is now a San. Engr. with Gannett, Fleming, Cordding and Carpenter in Harrisburg—Charles Gilman Hyde is now Emeritus Prof. of San. Eng. at the Univ. of Cal., having retired this year.—Lt. H. E. "Boone" Hudson is now at Ft. Belvoir with Capt. Hayes Black and Charlie Spaulding.

* * *

How "ya" "gonna" keep 'em down on the farm when the USPHS reports that there are five million rural homes that cry for safe water supplies and an equal number of sanitary privies still to be built.

* * *

Saw where Tom Skinker of St. Louis (next year's AWWA Host City) says that six years after the war St. Louis water rates should be cut 25 to 50 per cent for, by then,

even the post-war improvements will be paid for.

* * *

Although issued in the village right next to ours, here's a house organ we just discovered—"Tapax Topics," a clever item in the lighter vein by Phil Trohn of the Tapax Mfg. Co., Mamaroneck, N. Y. Tapax, in case you didn't know, stops the rattle in that manhole cover in front of your house.

* * *

Our recent listing of house organs met such interesting response that we have decided to list the publications of AWWA Sections and Sewage Works Assn. If you want yours listed, send name and address, editor and issue date.

* * *

Now that the various trade papers and journals have had their editorial say in commendation of the appointment of Sam Morris as Gen. Mgr. of the Los Angeles Water and Power Dept., may this "one small voice" point out what none of them mentioned—that, in addition to his other qualifications, Sam is a "swell guy" and a good story teller.

* * *

Ferd Fischer of Cleveland told this one for our collection of "word mangling": "A Sewer Board member in a mid-western town was conducting a group of visitors through the treatment works, and like many superintendents who want to show the beautiful effluent first, he began at the chlorine contact chamber following the trickling filters. 'This,' he explained, 'is where we take the *bacteria* out of the sewage.' A good beginning deserves a good ending, and so when he arrived at the sedimentation tanks he proudly announced to the visitors, 'And this is where we take out the *Fronteria*'."

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Installation of BUFFALO Model RA-8 at Centerville-Osterville Fire District, Cape Cod, Mass. 8 Cylinders with dual drive and a 75 KW Fairbanks Morse generator at the gear end and a 50 HP Warren pump at the flywheel end.

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When laying out an installation, it's good practice not only to plan space for stand-by motor generator or pumping sets, but also to let there be room for the added equipment that future growth may demand. Ask any operating man whose motors are crowded in a narrow space between walls.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Water Works & Sewerage, published monthly at Chicago Ill., for Oct. 1, 1944.

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward S. Gillette, who, having been duly sworn according to law, deposes and says that he is the publisher of the Water Works & Sewerage and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Edward S. Gillette, 330 S. Wells St., Chicago 6, Ill.
Editor—L. H. Enslow, 155 E. 44th St., New York 17, N. Y.

Managing Editor—John Cecil Black, 330 S. Wells St., Chicago 6, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Gillette Publishing Company, 330 S. Wells St., Chicago 6, Ill.
Edward S. Gillette, 330 S. Wells St., Chicago 6, Ill.
L. H. Enslow, 155 E. 44th St., New York 17, N. Y.
H. P. Gillette, 330 S. Wells St., Chicago 6, Ill.
Winifred Gillette, 1125 Oak Grove Ave., San Marino, Calif.
Mrs. R. W. Hume, 303 S. Stone Ave., La Grange, Ill.
Louise E. Forsythe, 410 Thayer Rd., Swarthmore, Pa.
Provident Trust Company, 17th and Chestnut Sts., Philadelphia, Pa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

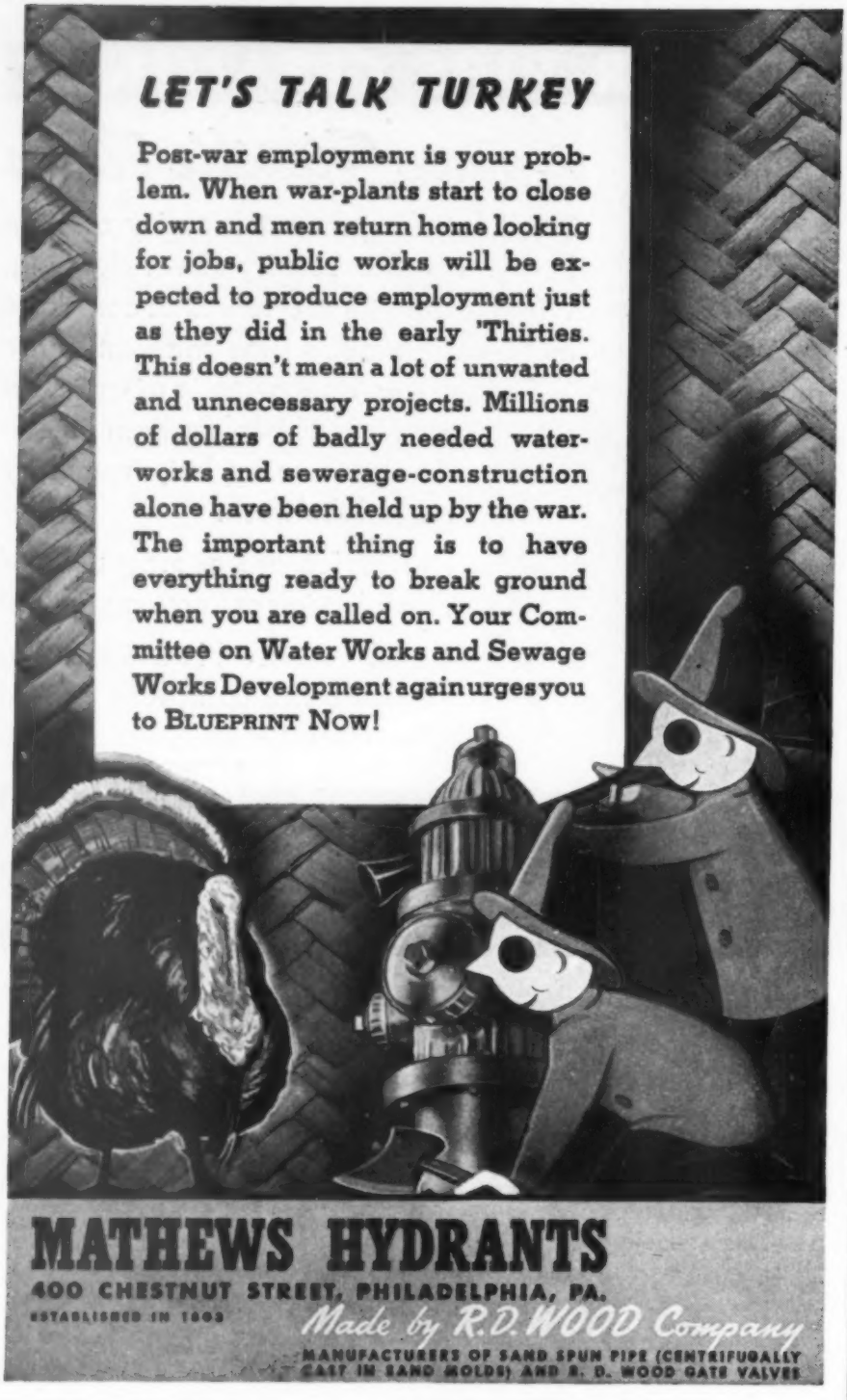
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is—. (This information is required from daily publications only.)

EDWARD S. GILLETTE,
Publisher.

Sworn to and subscribed before me this 21st day of September, 1944.

(Seal)

KITTIE C. WOULFE,
Notary Public.
(My commission expires February 7th, 1946.)


LET'S TALK TURKEY
Post-war employment is your problem. When war-plants start to close down and men return home looking for jobs, public works will be expected to produce employment just as they did in the early 'Thirties. This doesn't mean a lot of unwanted and unnecessary projects. Millions of dollars of badly needed water-works and sewerage-construction alone have been held up by the war. The important thing is to have everything ready to break ground when you are called on. Your Committee on Water Works and Sewage Works Development again urges you to BLUEPRINT NOW!
MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1803
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

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ANTHRACITE EQUIPMENT CORP.
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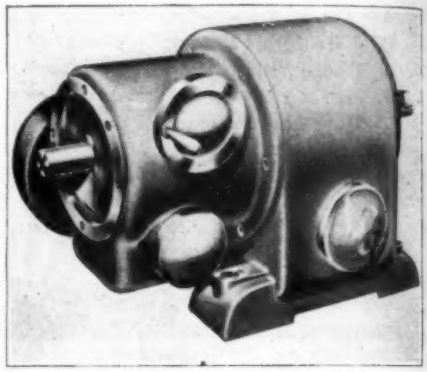
MANUFACTURERS' and EQUIPMENT News

Lombard's New Variable Speed Drive

We can't devote as much space to the subject as the news release did, but we are sure you will be interested in the new Lombard Variable Speed Drive shown in the accompanying cut. That is you will be interested if you have a speed and transmission problem involving motor generator drives, pumps, conveyors, or timing control equipment.



Backed by "Fifty years of Control Engineering" this new Variable Speed Drive, manufactured by the Lombard Governor Corp., differs from conventional types in that it uses the V-Belt only as a control medium and not as both drive and control. Scarcely larger than the motor with which it is used, even up to 100 hp., the unit has many advantages, all of which are described in a bulletin which may be obtained from—The Lombard Governor Co., Ashland, Mass.

Portable Electric Hand Searchlight

Water and sewage plant operators, who have occasion to go out to a coagulating basin or settling tank at night, will find the "Big Beam" No. 411 Portable Electric Hand Searchlight a big help. Made by the U-C Lite Manuf. Co., this lamp, powered by a heavy-duty,

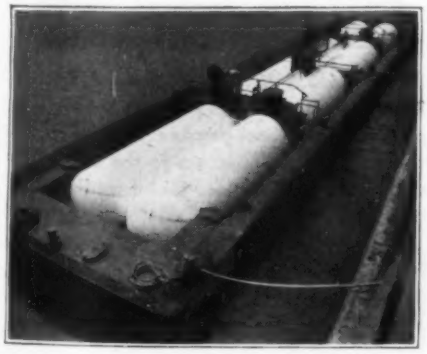
shock-proof, six-volt storage battery, will project an intense beam for a distance of 2500 ft.

It is possible, by means of a snap-on lens to give the same vol-

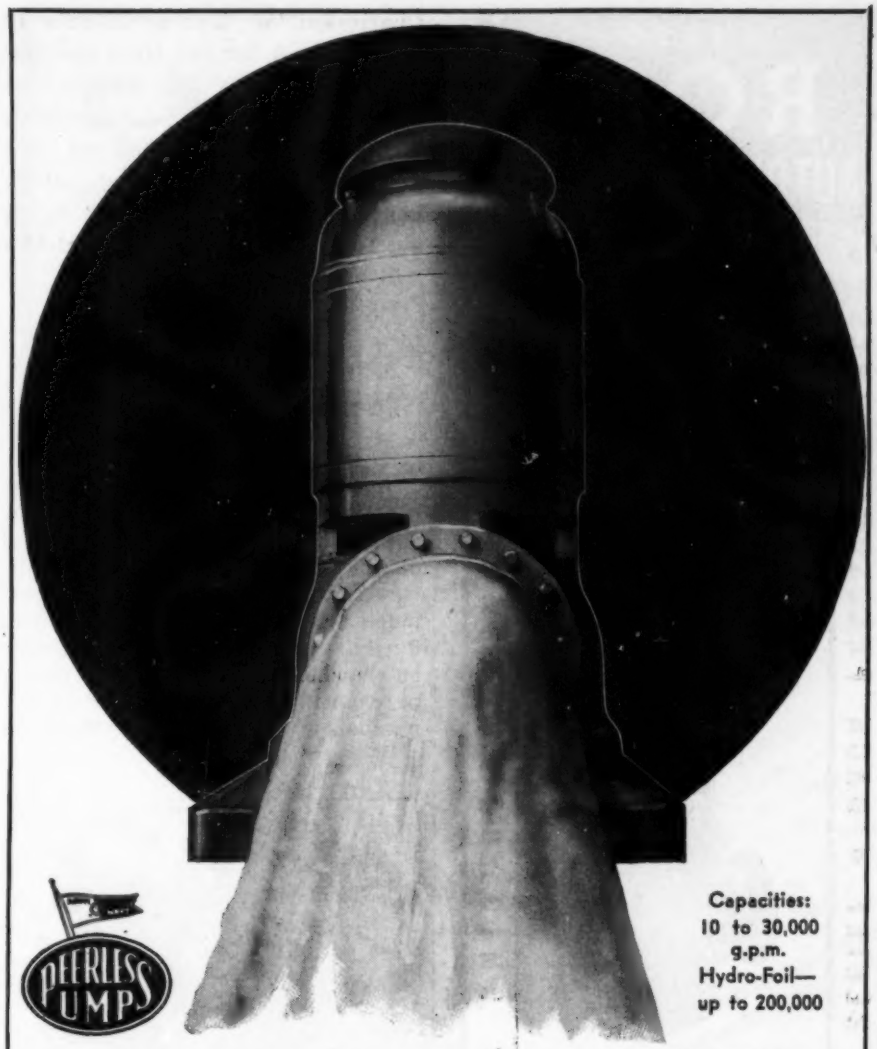
ume of light over a wide area. This "Big Beam" light may be recharged easily without removing the battery from the container, and may be accomplished by A-C charger, or D. C. line. If you prefer a dry-cell model may be obtained from U-C Lite Mfg. Co., Chicago 11, Ill., or write to Guy Northrupp & Co., Inc., 50 Church St., New York, N. Y.

Chlorine by Barge

We know a lot of small water and sewage plants that would gasp at the sight of the new method of transporting chlorine (developed by the Pittsburgh Plate Glass Co.—See cut). But we also know that large cities like Buffalo, Detroit, Cleveland, Chicago, and other Great Lakes cities as well as all of the



large cities on navigable rivers and the oceans, may well cast an appraising eye at this new method of transporting chlorine first tried out with the delivery of 380 tons of chlorine from Natrium, W. Va., to



Capacities: 10 to 30,000 g.p.m. Hydro-Foil—up to 200,000

PUMP WATER UNCONTAMINATED

Peerless Water Lubricated Pumps completely eliminate the use of oil underground; yet the line shaft is thoroughly lubricated by the well's own water. Thus, the original purity of the well water is retained. Peerless produces a water pump for every purpose. Ask for literature.

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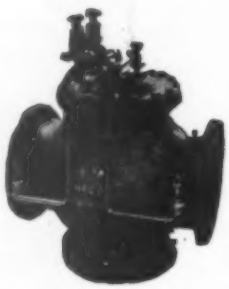

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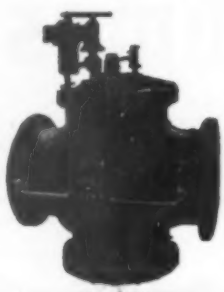
Combination automatic control both directions through the valve.
A self-contained unit, with three or more automatic controls.



REMOTE CONTROL VALVE
Electric remote control—solenoid or motor can be furnished.
Adapted for use as primary or secondary control on any of the hydraulically controlled or operated valves.

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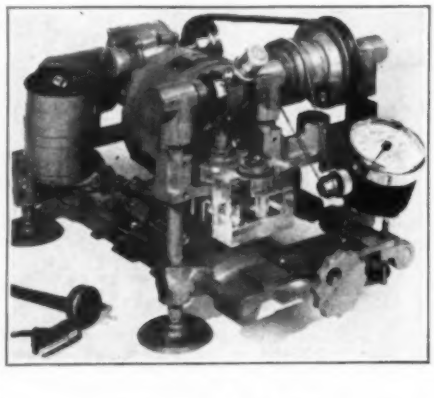
FLOAT VALVES • REDUCING AND REGULATING VALVES

ROSS VALVE MFG. CO.
INCORPORATED
P O BOX 595, TROY, N Y

Charleston, W. Va., a distance of 203 miles. A far cry from the first 105-lb. cylinders are these four fusion-welded tanks, each holding 95 tons of liquid chlorine. The barge itself is 135 ft. long, with a beam of 26 ft., so you can figure out for yourself whether your dock will take it.

Tachometers on Chemical Feeders

Jeff Corydon, of Chem-Feeds, has a new idea; this time a Tachometer applied to the variable speed control on the Var-I-Feeder reagent pumps which, by means of variable speed pulley drive, give finger tip control during operation. The tachometer on the chemical feeder gives a means of counting off the number of the number of constant shots made by

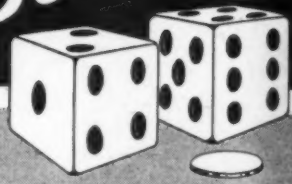


the pump piston. According to Jeff, "no arbitrary scale of approximation is as correct as the actual 'counting off' of the volumetric units fed, especially if the counting is done at the displacement pump piston where it is beyond errors due to belt slip, motor slowdown, voltage fluctuation or other variables." This indicator tachometer unit is adapted to automatic proportion control from water meters by means of a miter and solenoid operated valve, shown at the rear left of the accompanying photograph of the unit.

Tachometer readings readily convert into gph. fed against various pressures by reference to a set of calibration curves, or the tachometer dial may be furnished with direct readings in gal. per hour if injection pressure is specified in advance. Chem-Feeds, makers of the Var-I-Feeder with Tachometer control, is located at 77 Reservoir Ave., Providence, R. I.

"The Pace Setter"

Gamble just a penny



TO KNOW HOW TO CONTROL SEWAGE GAS IN YOUR TREATMENT PLANT

Yes . . . Your name and address on a penny postcard is all that is necessary for you to receive the new "VAREC" Sewage Gas Control and Safety Devices Catalog and Handbook S-3.

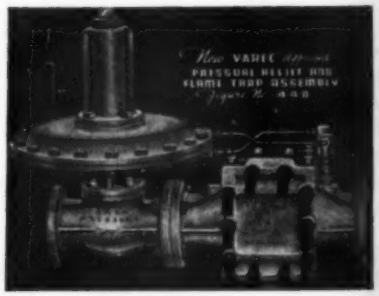


Fig. No. 440. "VAREC" Approved Pressure Relief and Flame Trap Assembly maintains a predetermined back-pressure throughout the system, passing surplus gas to the burner. It stops flame propagation. Non-corrosive aluminum construction.

"VAREC" APPROVED PRODUCTS
Pressure Relief and Vacuum Breaker Valves — Flame Arresters — Waste Gas Burners — Regulators — Check Valves — Manometers — Drip and Sediment Traps — Handhole and Manhole Covers — Sampling Hatches.

The VAPOR RECOVERY SYSTEMS COMPANY
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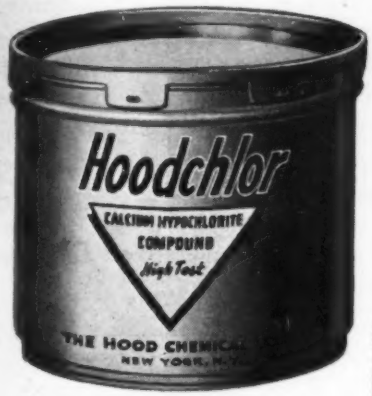
NEW YORK CITY . . . HOUSTON, TEXAS . . . NEW ORLEANS, LA. . . . TULSA, OKLAHOMA
Agencies Everywhere

New Handy Container for Hypochlorite

Take a look at the accompanying cut and see the new type of container being used by the Hood Chemical Co., of 1819 Broadway, New York, N. Y., for its product of high test calcium hypochlorite. Holding 25 lb., this resealable pail



of steel is lined with a special chlorine resistant lacquer. Hood Chemical has found the package, with its resealable feature successful in various war theaters and is adopting it for general use. Look for it.

Dresser Industries, Inc.

At a special meeting of the Dresser stockholders it was decided to change the name of the company to Dresser Industries, Inc., because it comprises a number of related companies producing equipment for the oil, gas, and water fields. And, as indicated in these columns last month, Dresser Industries will acquire by means of stock transfer, on Nov. 1, the properties of the International-Stacey Co., one of which is the Roots-Connersville Blower Co., of Connersville, Ind.

Diamond Purchased Emeryville Chemical

The Diamond Alkali Co., of Pittsburgh, has expanded its line of products and facilities for producing by purchasing the Emeryville Chemical Co., 405 Montgomery St., San Francisco, Cal., with its plant for the manufacture of silicate chemicals located at 1269 66th St., Emeryville.

Stanley Pedder and Charles Eckland will continue in their present capacities as Pres. and Vice-Pres., and no changes in personnel are contemplated except that Howard R. Bauer will be transferred from the Diamond Alkali organization to San Francisco to act as Gen. Mgr. of the Emeryville Chem. Co.

SMITH
TAPPING SLEEVES
THE A.P. SMITH MFG. CO. EAST ORANGE, N.J.
Symbol of Quality Since 1889
MAKING PRESSURE CONNECTIONS Without Stopping the Service
SMITH Tapping Sleeves for making pressure connections to A.W.W.A. standard mains, classes A, B and C, and for pressures up to 150 lbs. per square inch, are made in four types, here illustrated. At top: 1. Clamped Sleeve Joint; 2. Bolted Sleeve Joint. Bottom row: 3. Bolted Sleeve Joint with flanged end joint valve connection; 4 Hackensack Sleeve Joint with flanged end joint valve connection.
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Valves and Hydrants — Valve Inserting Machines — Tapping Sleeves — Tapping Valves — Hat Flanges and Water Meters
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Large stock enables us to make prompt shipments.

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SPARLING MAIN-LINE METERS

Used in
WATERWORKS
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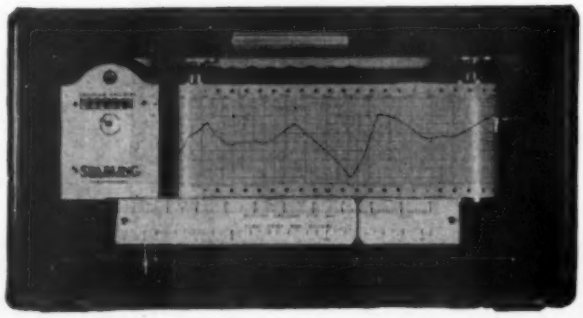

ACCURATE knowledge of main-line flows is indispensable. Sparling Meters, assuring consistent accuracy of measurement, are easily installed at comparatively little cost to give you complete information.

Get the facts from Bulletin 308.

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Janssen Represents Amer. Well in Conn.

Lee Chamberlain, who had us in the view finder of his movie camera at the costume ball of the NEWWA meeting in Poland Spring, told us that American Well Works, of Aurora, Ill., has appointed J. R. Janssen, P. O. Box 348, Cheshire, Conn., as their representative for the entire state. C. W. "Bill" Baldwin, of 9 Middle St., East Weymouth, Mass., will continue to represent the company in the other New England States. (Lee, in case you didn't know, is Eastern Manager for the Amer. Well and is located in New York.)

H. K. Porter of Pittsburgh News

In a "flock" of news releases to magazines recently, each one containing the note "To avoid confusion with H. K. Porter Inc., Everett, Mass., the use of the full name, H. K. Porter Co. Inc., Pittsburgh, Pa., will be a p p r e c i a t e d," we learned that Mr. Fred Grotts, Pres. of the subsidiary, Fort Pitt Steel

Fred Grotts

H. A. Hintz

Co., has been named to the newly created position of Director of Research and Metallurgy, and William W. Greenway has been appointed Production Engineer for Mt. Vernon Car Manufacturing Co. and J. P. Devine Mfg. Co., both divisions of the parent company; also that George Green has been appointed Vice Pres. in charge of sales of Mt. Vernon Car Mfg. Co.

Further information in the releases was to the effect that the H. K. Porter Co., of Pittsburgh, Pa., has opened a West Coast office at 849 Petroleum Bldg., Los Angeles 15, Cal. Harold A. Hintz has been appointed district manager for the territory.

Sterling Engine Has South American Representative

Another company in the field of equipment for water and sewage plants has taken the good neighbor policy to heart. Sterling Engine Co., of Buffalo, N. Y., has appointed Lt. Col. Charles B. Whitehead, (until recently on active duty with the U.S. AAF) as South Amerian representative, of the company. Col. Whitehead has left for Rio de Janeiro, Brazil, as well as cities in Peru, Chile, Venezuela, Columbia, Ecuador, and Bolivia. Col. Whitehead has an intimate knowledge of South America, having been in business there prior to the war. One of the products that is expected to be of interest and value to the South American market is Sterling's new Viking Diesel Engines.

Worthington Announcements

Direct from the news releases of the Worthington Pump and Machinery Corp., Harrison, N. J., comes the following: ". . . appointment of William J. Van Vleck as Manager of its Atlanta Office, succeeding Edward Stauverman who has resigned. Van Vleck entered Worthington's employ in 1924 as a member of the student group"; and "C. W. Camp, formerly with Crocker-Wheeler Electric Manufacturing Co. for 38 years, specializing in application engineering, is now associated with Worthington as Consulting Electrical Engineer. . . . Mr. Camp replaces the late Harry Wood."

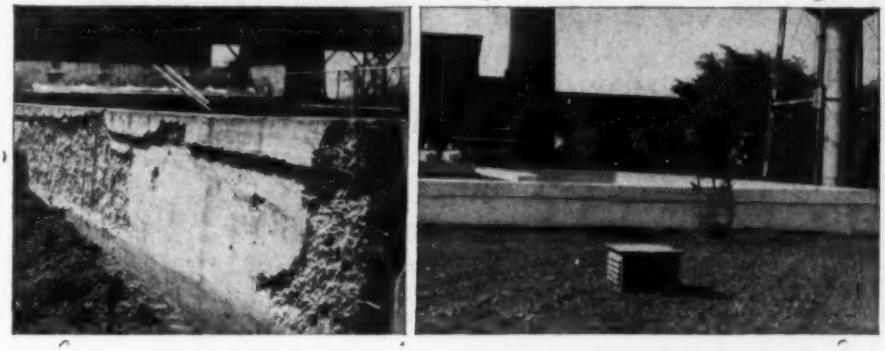
Norman Abrams Made Badger's Texas Manager

Norman Abrams of Waco, Texas, who for many years has been selling Badger meters, has been placed in complete charge of sales and management of sales in Texas for Badger Meter Mfg. Co. of Milwaukee.

Pittsburgh Equitable Meter News

J. E. Brown, veteran sales executive of Pittsburgh Equitable Meter Co.-Merco Nordstrom Valve Co., was recently promoted to the position of Asst. to the General Sales Manager of the combined organization. "Ed," as he is known to many friends and associates, will remain in Pittsburgh. It was the Pittsburgh Me-

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



"GUNITE" SAVES COMPLETE REBUILDING

The above are "before" and "after" photographs of a sedimentation basin at the water works of the City of Batavia, New York, which was restored by us in May, 1944, under the direction of Mr. Fred F. Gordon, Consulting Engineer.

As shown to the left, the original concrete walls of this basin were badly deteriorated. All disintegrated concrete was chipped out to a solid surface and reinforcing mesh bolted in place. An average of more than two inches of "GUNITE" was placed on the inside and outside of the walls. The filter beds at the same plant were similarly restored.

Our Bulletin 2200 describes scores of cases where "GUNITE" has saved failing concrete structures of every description, together with numerous other applications for both repair and new construction. A simple request will bring you a copy, without obligation.

MANUFACTURERS OF THE "CEMENT GUN"

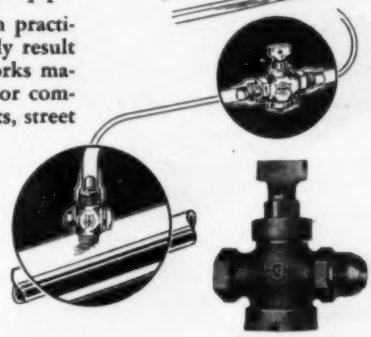
NEW HOUSING PROJECTS ONLY SMALL PART OF RECONVERSION PROGRAM

HAYS manufactures a complete line of stops and fittings for use with iron, copper, or lead pipe.

Reconversion to peacetime production in practically every field of industry will undoubtedly result in an unusually heavy demand for water works materials. Additions, alterations, replacements or complete new systems . . . new housing projects, street and road construction and repair . . . all will require water works materials.

We urge you to send us your orders *now* so that we will be in a position to fill your future requirements promptly.

Seventy-five years experience in engineering research, together with a long established and highly developed system of unified manufacturing control, is your assurance of obtaining the best in water works products.



CURB STOP

BE SURE TO REPLACE WITH ANOTHER HAYS STOP

CORPORATION STOPS

HAYS COPPER · BRASS · LEAD · IRON WATER WORKS PRODUCTS HAYS MANUFACTURING CO., ERIE, PA.

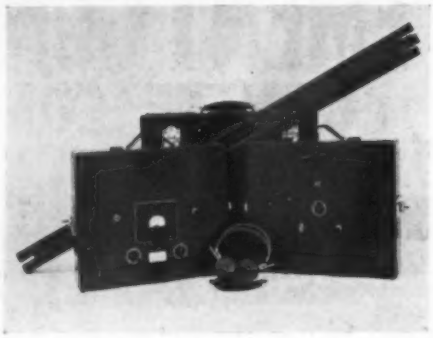
BUY EXTRA WAR BONDS

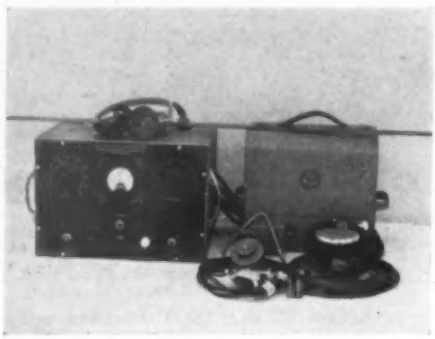
M-SCOPE

Pipe Finder

Leak Survey Equipment

Leak Detector





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THE DOW CHEMICAL COMPANY

MIDLAND MICHIGAN

ter Co. when Brown joined the organization in 1906.

J. A. Kerr, Gen. Sales Mgr., has also announced the consolidation of the Columbia, S. C., and Atlanta,

J. E. Brown

C. C. Moore

Ga., offices, coincident with the retirements of F. G. Swaffield (40 years' service), who was Dist. Mgr. of the Columbia office. Henceforth this territory will be under the managership of C. C. Moore of the Atlanta office.

Empire Emri* Tread Floor Brick

"Something New Under Foot" is the way the Empire Emery Corp. of 18 E. 41st St., New York 17, N. Y., describes a new non-slip floor surface. The company highly recommends the item wherever slippery surfaces are contributory to the danger of falling. The company doesn't mention the floor of a sludge pumping station, for example, but it might be well to look into the product if you are trying to remedy a slippery floor in that particular spot in your plant. (*Reg. Trade Mark.)

Regulator for Domestic Water Tanks

Right after we read about the recent terrible explosion in Cleveland, and about explosions in sewage plants in two widely separated locations (Mich. and Tenn.), we came across an advertisement for the Watts Regulator for Domestic Water Tanks. Of course a water tank can not be as destructive as were these explosions we mentioned, but it can cause a lot of havoc in a small space of one home. The idea of the Watts Regulator is that the only safe protection is a combination of temperature and pressure relief valve. Sounds like a good idea as described in a folder of the Watts Regulator Co. of Lawrence, Mass.

Photoelectric pH Determination

In these times of restricted war regulations, you may not be able to purchase electronic instruments for the determination of pH; but it is possible to obtain, without priority,

a piece of apparatus that determines pH photoelectrically. Manufactured by the Photovolt Corp., 95 Madison Ave., New York 16, N. Y., the Lumetron Colorimeter Model 400 may be your answer to a fast, accurate, and easy method of determining pH. Write for Bull. 505.

Heesch Represents Hooker in New Jersey

Hooker Electrochemical Co., of Niagara Falls, N. Y., a name well known to the water works and sewerage field, has announced the appointment of Herbert Heesch to its

Herbert Heesch

sales staff in the northern New Jersey area. Mr. Heesch, a graduate Chemical Engineer from the Univ. of Rochester in 1932, has had prior experience with Hooker as well as a salesman with the Heyden Chemical Corp.

Micromet for Household Water Treatment

Water corrosion control has entered the family kitchen with the advent of Micromet, a development of the Calgon Co. Micromet is a new form of the glassy-sodium phosphates, and is but slowly soluble in water, thereby making it easy to feed small quantities to the rel-

High Pressure Storage of DIGESTER GAS

Consult With Us NOW—

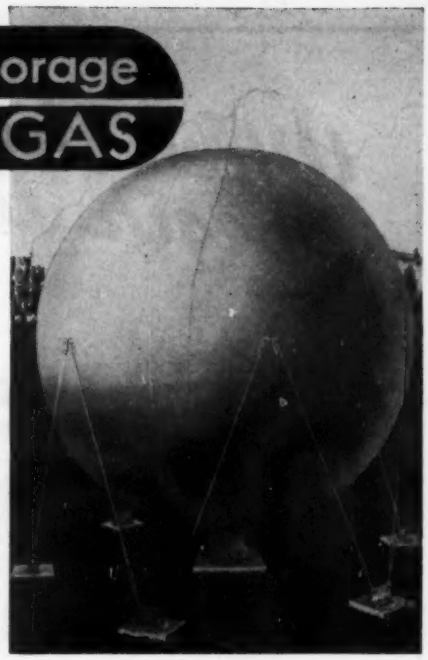
if you are contemplating the purchase of a digester gas holder in 1945. It will enable us to fill necessary requisitions for materials and thereby facilitate earliest possible erection as soon as materials are available.

The Stacey Brothers All-Welded High Pressure Sphere enables the storage of sewage digester gas in the smallest practicable space. It combines utmost safety with pleasing appearance.

THE STACEY BROTHERS GAS CONSTRUCTION CO.

Executive Office: 5535 Vine St. Cincinnati 16, Ohio

Eastern Office 21 West Street New York 6, N. Y.



The strong spherical shape blends harmoniously with surrounding buildings and landscapes, and is ideal for residential and outlying districts where appearance is a factor and heights and areas of structures are limited.

All-Welded

Stacey Brothers SPHERES

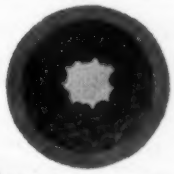
ENGINEERS • FABRICATORS • RECOGNIZED EXPERIENCE & FACILITIES

MORE WATER —LESS WORRY

by CLEANING your WATER MAINS using The NATIONAL METHOD

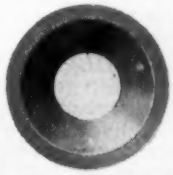
No need to worry about reduced water main capacities just when you need every gallon you can pump. Do as many other communities — large and small — are doing: clean those old clogged up mains by using the NATIONAL METHOD of water main cleaning.

We offer you (1) greater volume of water; (2) lower pumping costs; (3) improved pressure; (4) cleaner water and (5) reduced insurance rates.



Before Cleaning

★ The NATIONAL METHOD



After Cleaning

GUARANTEED TO RESTORE 95% ORIGINAL CAPACITY

The National Water Main Cleaning Co.

30 Church St. New York 7

Branches:

115 Peterboro St., Boston 15, Mass.
910 William Oliver Bldg., Atlanta 3, Ga.
7103 Dale Ave., St. Louis 17, Mo.
3707 Madison St., Kansas City 2, Mo.
3812 Castellar St., Omaha 5, Neb.
P. O. Box 683, Jacksonville 1, Fla.
205 West Wacker Dr., Chicago 6, Ill.
501 Howard St., San Francisco, Calif.
2028 Union Ave., Montreal, Can.
576 Wall St., Winnipeg, Can.

When the Guns begin to rust—

---- will the men who manned them be assured of work? And will your community be getting that long-needed waterworks improvement? They go hand in hand.

RENSSELAER VALVE COMPANY, Troy, New York

'BESTOLIFE

LEAD SEAL JOINT SEALING AND ANTI-SEIZE PIPE JOINT COMPOUNDS

'BESTOLIFE Compounds have been used successfully for years in Water Works and Sewerage plants.

They obtain their effective anti-corrosion sealing characteristics from the metallic lead base of the compounds.

Use 'BESTOLIFE Compounds on water, oil, gas and gasoline lines; all threaded connections in valves, hydrants, pumps, engines, air compressors, etc., and on all studs and bolts. Also recommended for meter repairing.

Manufactured Exclusively By

I. H. GRANCELL

MIRAMONTE AND EAST NADEAU ST.
LOS ANGELES 1, CALIFORNIA

EXPORT: THE NATIONAL SUPPLY CORP.

METER MITTENS

QUICKLY AND EASILY INSTALLED

Meter Mittens insulate water meters against heat loss and save many basement meters from freezing. Inexpensive, costing but a fraction of the expense of a frozen meter.

FORD

Meter Box Co.

WABASH, INDIANA

atively small volumes of water used daily in a household. A simple feeder constructed from pipe, reducers, a tee, valve, bushings, screen, and a plug can be installed by a plumber in short time. The original charge is one lb. of Micromet and it dissolves at the rate of 25 per cent a month. Calgon's motto now is "Every home its own water treatment plant."

Economy Pumps New Officers

According to an announcement of the Economy Pumps Inc., of Hamilton, Ohio, E. E. Quimby and

E. E. Quimby

F. H. Gaylord

Frank H. Gaylord were elected Commercial Vice-presidents of the organization. Mr. Quimby will specialize in sales transactions for large projects which are too involved for a resale agency, such as flood control. Mr. Gaylord will direct the sales and promotion of Economy's new Wholesalers' Div. In making the announcement Mr. L. G. L. Thomas, Gen. Man. of the company, said these elections were one more step in the preparation and organization of a broad post-war engineering and sales program.

Recent "E" Awards

For excellent service rendered in production of war materials, the Army and Navy still awards the coveted "E" or the renewal star to indicate an additional six months of production at high efficiency. Two firms recently so rewarded were the Peerless Pump Co. of Los Angeles, Cal., its first award, and the Stacey Bros. Gas Construction Co., which received a star for its "E" flag.

Buffalo Tank's Florida Representative

H. J. Hechler, Construction Specialties, 125 N. E. Sixth St., Miami 11, Fla., has been appointed as Dis-

When You Specify

Meters and Recorders

Be Sure To Demand

•ACCURACY •RELIABILITY
•SOUND ENGINEERING
•MODERN APPEARANCE

Regardless of whether your problem calls for the use of a Venturi Tube, Weir, or Flume, you can depend on Bailey Meter Company to design and construct both the primary element and the register for maximum accuracy.

A vast amount of experience gained from thousands of installations of metering equipment, together with extensive experimental work in our own hydraulic laboratory and in the laboratories of the Ohio State University, Cornell University, Case School of Applied Science and other institutions, is back of every Bailey Primary Element.

The reliability of Bailey Meters and Recorders is attested to by the fact that thousands of dollars worth of steam and water are sold monthly and billed solely on the basis of readings from Bailey Meters.

No small share of the accuracy and reliability of Bailey Meters is due to the conservative engineering policy of the Company. New ideas and designs are not offered for sale until they have been thoroughly tested both in the laboratory and in actual service.

Bailey Meters, Recorders and Controllers present a thoroughly modern yet conservative appearance.

Write for your copy of Bulletins No. 301 and 302, describing Bailey Fluid Meters for steam, liquids, gases, sewage, sludge, and compressed air.

MU-14

BAILEY METER
• COMPANY •

1072 Ivanhoe Road, Cleveland, Ohio

BAILEY METER COMPANY LTD., MONTREAL

trict Engineer of the Buffalo Tank Corp. of Newark, N. J., and Buffalo, N. Y. Mr. Hechler writes that the new Buffalo Calculator for Pressure Vessels ASME Code is now available on request.

LITERATURE AND CATALOGS

Do You Know that the insect population of each square mile of the earth's surface is more than the human population of the world? Or do you know that ordinary steel begins to rust two minutes after it is exposed to air? Or do you know that Jerry McCarthy, of the Sales Dept. of the Everett plant of Monsanto Chemical Co., owns the world's first Resloomed suit which will not shrink, bag, wrinkle or lose its press when caught in a rain?

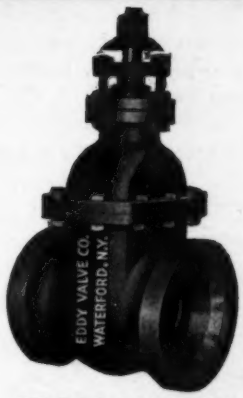
Do you know that all this information is contained in the Sept. issue of the **Monsanto Magazine?** And do you know that this magazine, which often contains stories of interest to water works and sewage works men, has a page entitled *"Do You Know?"* from which we cribbed these items?

Next time you have lunch with "Jerry" just "accidentally" spill your glass of water on him—if he doesn't jump he has on that Resloomed suit—Your wife will also be interested in Monsanto's new Syton which prevents runs in silk stockings, and—believe it or not, no more shine on your blue serge suit.

"Geographers tell us that two-thirds of the earth's surface is covered with water . . ." is the opening sentence of the Philadelphia Quartz Co. Sept. issue of Silicate **"P's & Q's"** in which is discussed the subject of silicates as an aid to coagulation. If you didn't read Harold Hay's article on the subject in the June 1944 issue of *W. W. & S.* then you may be interested in this No. 9 issue of Vol. 24 which naturally may be obtained from the Philadelphia Quartz Co. at 121 So. Third St., Philadelphia, Pa. (P. S.—The postmaster says, "Don't forget the zone number 6.")

With a title too long to pronounce in one breath, the Link-Belt Co. has issued a new **Book No. 1824—"A Complete Data Book on Worm Gear Speed Reducers for Industrial Applications."** If your catalog file contains Link-Belt Book Nos. 1524 and

EDDY
FIRE HYDRANTS
AND VALVES—
WATER WORKS EQUIPMENT



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For
Water Works
and
Sewage Disposal
Plants

EDDY FIRE
HYDRANTS
For Fire
Protection
Service

Write for Complete Catalog

Eddy
VALVE COMPANY
WATERFORD, N. Y.

HYDRO-TITE

HYDRO-TITE — The self-caulking joint compound that makes cast iron water pipe joints — strong — tight — flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

FIBREX — The sanitary paper packing that is used like braided jute. Free from bacteria — treated with a water repellent — put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

HYDRAULIC DEVELOPMENT CORPORATION
50 Church St.
New York, N. Y.

DRY BRAIDED
Fibrex

RODNEY HUNT

GATES and HOISTS

Metal or timber sluice gates of all sizes and designs, approved by engineers everywhere. Improved gate stands and hoists for hand or motor operation. Also flap and mud valves, shear and filler gates, trash racks and rakes. Dependable canal equipment from dam to tail-race since 1840.

Write for Special Catalog Today!

RODNEY HUNT

RODNEY HUNT MACHINE CO.
118 Lake St., Orange, Mass., U. S. A.

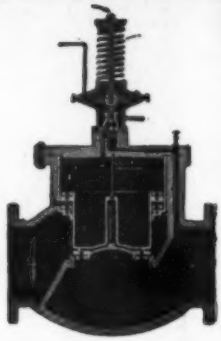
1524B, you will want to obtain this new volume of 100 pages which replaces those outdated ones. Or, if you haven't seen past issues, you may still want this one if you are interested in worm gear speed reducers, their sizes, dimensions, weights, horse-power, and the best means of making a selection of this type of reducer. A post card, letter or telephone call to Link-Belt Co., Philadelphia, Chicago, San Francisco, or any other branch office, will bring Book No. 1824 to your office.

Our contact with the Automatic Control Co. heretofore has been through a highly enjoyable house organ from which we have quoted in "Here and There" on occasion, but it wasn't until we received a copy of their **General Catalog No. C-4** that we learned how many things they make for water works and sewage disposal plants.

This catalog is in reality a binding of some ten or so individual bulletins, containing some mighty interesting information on the subject of elevated tank controls, float operated controls, and pressure tank controls. There are Duotrols, Tanktrols, Floatrols, Selectrols and most any type of "-Trols" one could want in a water or sewage plant. One section deals with the applications of float operated controls in these plants discussing pumps, controls, recirculating pumps, high and low alarm circuits. And there is another section dealing with—but there isn't space to tell you here. We suggest you obtain the Catalog No. C-4 for yourself by writing to the Automatic Control Co., 1005 University Ave., St. Paul 4, Minn.

The Yeomans Guard, of the Yeomans Bros. Co. in Chicago, is issued every other month and usually can be counted on to contain an interesting story. The Aug.-Sept. issue was no exception, for it contains "A Successful Solution to Scum, Grease, and Sludge Pumping in Treatment Plants." There is also a column on "How to Prevent Accidents from Sewage Gas and Oxygen Deficiency." If you are interested (and you should be) in either of these items write Harold McGrath, Editor, care Yeomans Bros., Chicago, Ill. (Oh yes, we almost forgot —in this particular issue Yeomans presents the "Streamline" Collector for primary sewage settling tanks.)

Stop Check
Single Acting
Altitude Valve



This valve installed in the upstream line automatically maintains a uniform water level within 3" to 12" variation to prevent any tank overflow; also, by means of the internal "stop check" piston assembly, prevents loss or return of storage water back through the valve—making the valve very desirable for use where metered water is purchased, or wherever it is imperative that there be no possible return flow.

This valve may be fitted with "Differential" Control for delayed opening, if desired.

Write for specifications and prices.

GOLDEN-ANDERSON VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

WRITE FOR INFORMATION

VOGT BROTHERS TRAFFIC MODEL FIRE HYDRANT

A.W.W.A.

VOGT BROTHERS MFG. CO. Incorporated LOUISVILLE, KY.
MAIN AT 14th
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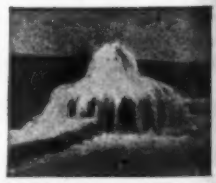
VOGT MFG. CO., Incorporated
P. O. BOX 1122 LOUISVILLE, KY.

AERO-MIX

AERATOR—MIXER

A Size and Type to Fit Your Problem in Water or Sewage Treatment.



WRITE FOR INFORMATION

P.F.T. Clarifiers for Rapid Precipitation of Sewage Solids

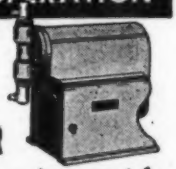
The P.F.T. Tray Clarifier embodies a design which affects the continuous rapid separation of the solids and liquid in sewage; and the immediate removal of the clarified effluent. A series of shallow settling areas over which the sewage is spread assures speedy precipitation. Its high rate of flow provides maximum capacity in minimum space; reducing the construction and operating costs of clarification equipment.

Write for Bulletin No. 210 containing complete information, including operating results.

P.F.T. Pacific Flush-Tank Company
4241 Ravenswood Ave., Chicago, Ill.
New York Charlotte, N. C.

..for ACCURACY and TROUBLE-FREE OPERATION

INSIST ON THE WILSON HYPO-CHLORINATOR



Engineered and Manufactured by

WILSON CHEMICAL FEEDERS, INC.

203 CLINTON STREET AD XX-1 BUFFALO 4, N. Y.

THE *Phipps & Bird* LABORATORY MIXER . . .

IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.

PHIPPS & BIRD, INC. Richmond, Va.

We have heard of potato peelers, and other little gadgets one can purchase from the pitch man on the street, but we had to open up the new **Bulletin No. 447** of the Chain Belt Co. to learn about the "Air Peeler," a patented feature producing faster priming and maximum volume in the **"Rex Speed Prime Pumps."** These are the pumps for general dewatering service such as the removal of water from flooded basements, excavations, and sewers. These Rex Speed Prime Pumps are useful for a number of other locations too, and range in capacity from 3000, to 125,000 gph. If you don't know someone in Chain Belt just write to the Company at 1600 West Bruce St., Milwaukee 4, Wis., and you'll receive this bulletin No. 447.

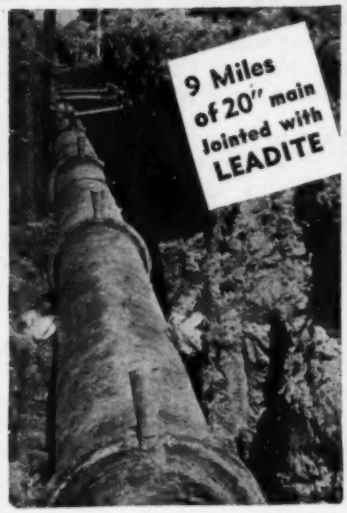
If you like history, particularly of early water purification plants, ask the American Water Works and Electric Co. for a copy of the latest issue of their house organ called, appropriately enough, *"Water,"* and read Martin Flentje's story on pages 24-25. Flentje tells the story of the famous Tom Thum who visited several cities where water plants were in existence in 1850. There are several other interesting bits of information, too. Write Miss McDonnell, Editor, at 50 Broad St., New York 4, N. Y., and tell her you would like to read those **"Sidelights on Early U. S. Water Works Companies."**

Maybe you don't have a gas holder, but if you do you certainly should be interested in Bulletin No. 1-44 of the Stacey Bros. Gas Construction Co., for it tells of the **Stacey Brothers Gas Holder Inspection Service.** They have a gadget which will cut a "coupon" (a disc) out of a gas holder without losing a single smell of gas, and from that coupon they can determine the condition as regards corrosion within the tank. Surprised? So were we. Of course, this service is primarily for wet seal gas holders but maybe they might tell you something about your sewage plant gas collectors and holders. Write them at 5535 Vine St., Cincinnati 16, Ohio.

We have seen it used many times but we never knew the darn thing was called a "Shadoof" until we read the book recently released by the Multiple V-Belt Drive Association. In this book entitled **"From the Shadoof to the Dominant Drive"** it says, "It was inevitable that one of man's earliest machines would be a device for obtaining water or transporting water. . . . Perhaps

LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe



Whether rough going or smooth, Leadite, for more than 40 years, has proved itself to be a very dependable self-caulking material that makes a good, tight, lasting joint!

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia 2, Pa.

No Caulking

GAS • WATER • OIL
METERS
GAS PRESSURE
REGULATORS
NORDSTROM LUBRICATED PLUG
VALVES
Pittsburgh Equitable Meter Co.
Merco Nordstrom Valve Co.
Main Office and Works—PITTSBURGH, PA.

CONTRACTS
Completely Installed

Water Works and Sewerage Plant Equipment

Turbine Equipment Co.
75 West St.
New York 6, N. Y.

the earliest machine based on the lever as a means of power transmission was the shadoof. The shadoof consisted of a pole hung on a post in such a way that it could be swing easily up and down or around. From one end of the pole a bucket was suspended, while at the other was a weight large enough to overbalance the bucket when it was filled with water."

Want to know more about the history of power transmission? Then write to the Multiple V-Belt Drive Assoc., 140 S. Dearborn St., Chicago 3, Ill., and tell them we sent you. (Oh yes there is a chapter in the book on V-Belt Drive.)

As if we didn't have enough to read already, we found on our desk recently a very interesting newcomer, known as the **Non-Ferrous Forgings Digest.** This new item is to be published periodically by the Brass Forgings Assoc., and from the looks of the first issue (October), it appears as though it would be of interest to any person or company interested in non-ferrous forgings; you know, brass, bronze, aluminum, and so forth, but no iron. Just send your name to the Brass Forgings Association, 420 Lexington Ave., New York, N. Y. Members of the Association are: Accurate Brass Co., Brooklyn; Chase Brass and Copper Co., Waterbury, Conn.; Mueller Brass Co., Port Huron, Mich.; Bohn Aluminum and Brass Corp., Detroit, Mich.; Harvey Metal Corp., Chicago; Revere Copper and Brass, Inc., New York; and Scovill Mfg. Co., Waterbury, Conn.

MECHANICAL EQUIPMENT BY ROBERTS FILTER MFG. CO. DARBY, PENNA.

KNOWN AROUND THE WORLD AS THE SIGN OF EXCELLENCE IN WATER TREATMENT EQUIPMENT

The years of experience behind the Roberts nameplate is your assurance that any water rectification problem is expertly handled to your best advantage. As manufacturing and installation engineers, the Roberts organization is equipped to meet your exact needs regardless of the size of the equipment or the complexity of the problem.

GRAVITY FILTERS • SOFTENING PLANTS AND EQUIPMENT • PRESSURE FILTERS ZEOLITE SOFTENERS • SWIMMING POOL RECIRCULATING APPARATUS SPECIAL WATER TREATMENT EQUIPMENT

We invite your inquiries

ROBERTS FILTER MANUFACTURING COMPANY • Darby, Pa.

TAPAX

***The* ORIGINAL *and* FINEST....**

Manhole Cushion U. S. Pat. No. 2,050,050 offers you the simplest solution for noisy, rattling covers. Easy to install. Lasting — Economical.

Write for story of Tapax and Trial Offer.

TAPAX MFG. CO., INC.
MAMARONECK NEW YORK

FOR SALE

At Greatly Reduced Price

10 Cast Steel 1,000-gallon Garbage Cookers, steam jacketed and agitated.

FOR COMPLETE DETAILS WRITE TO:
FIRST MACHINERY CORPORATION
819-837 East 9th Street, N. Y. No. 9

Position Wanted

By Engineer with 17 years' experience in water and sewage treatment; five years in construction, twelve years in plant operation and laboratory control. Licensed to operate water and sewage plants in New Jersey. Box 700, Water Works and Sewerage, 155 East 44th St., New York 17, N. Y.

SAVE *with* TENNESSEE CORPORATION ferri-floc

Write today for actual case histories of plants now using the ideal ferric coagulant.

TENNESSEE CORPORATION
Atlanta, Georgia Lockland, Ohio

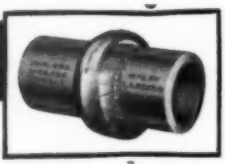
ZECO GREENSAND ZEOLITE

ZECO and Hi-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.

ZEOLITE CHEMICAL CO.
Sales Office New York, N. Y. Factory
Pioneer Producer of GREENSAND ZEOLITE MINERAL

SAVE MONEY USE ACTIVATED ALUM and BLACKALUM

STUART-BRUMLEY CORP.
516 North Charles St.
Baltimore Maryland



GASKET AND FORM
The Perfected Method for Making The PIPE JOINTS OF CEMENT

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

L. A. WESTON Adams, Mass.

BLEACHING POWDER
FOR WATER SANITATION

COPPERAS
SULPHATE OF IRON
FOR WATER PURIFICATION

E. M. SERGEANT PULP AND CHEMICAL CO., INC.
EMPIRE STATE BUILDING
NEW YORK I

Manual de

INGENIERIA SANITARIA

1945

CULTIVATE this ACTIVE EXPORT MARKET

A campaign is being waged throughout South and Central America against waterborne diseases. Water suply systems are being improved, studies are being made and plans are being drawn for better sanitary engineering.

Particular attention is being given to areas along strategic highways; around airports and shiping centers; and in the vicinity of defense bases. These activities are part of a campaign against typhoid fever and other diseases spread by waterborne parasites.

From Peru, from Colombia, from Mexico and Paraguay and all other Latin American countries come reports of plants under construction or plans in the making. Manufacturers of supplies and equipment to serve the water and sewerage fields, will find this export market worth cultivating.

NEW Specialized Coverage

Water Works Superintendents
Consulting Engineers
Managers of Utility Companies
Equipment Distributors

Manual de Ingenieria Sanitaria is designed to serve as a practical Reference and Data book for the men in Latin America charged with the problems of water supply and sanitation.

Printed in Spanish, it is a handbook of informative data and a buyers' guide. Published annually it gives to the advertisers year-around reader interest and offers access to the greatest potential market in the world today.

Sanitary Engineers
Chemists
Public Officials
Civil Engineers and Contractors

The first annual edition will be released in January 1945. It will be comparable to the English edition of the Reference and Data issue of Water Works and Sewerage, which is used by superintendents, operators, engineers and public officials throughout the United States and many other countries.

The Managing Editor of Ingenieria Sanitaria spent the summer of 1944 in South America making studies and reports of this field.

2,000 Guaranteed Circulation.
Schedule Space Now — Write for Details.

Manual de
INGENIERIA SANITARIA

GILLETTE PUBLISHING COMPANY • 330 S. WELLS ST., CHICAGO 6

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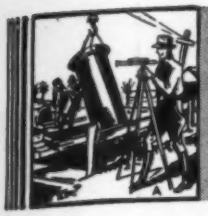

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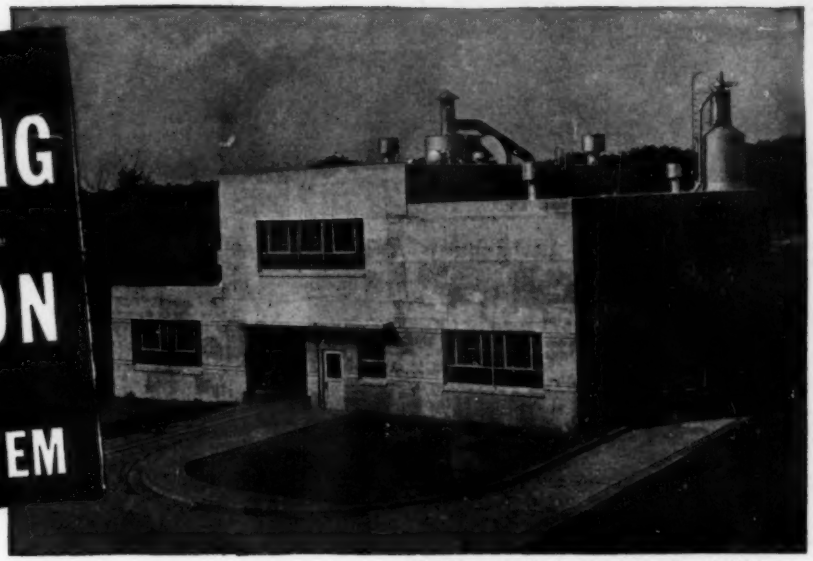

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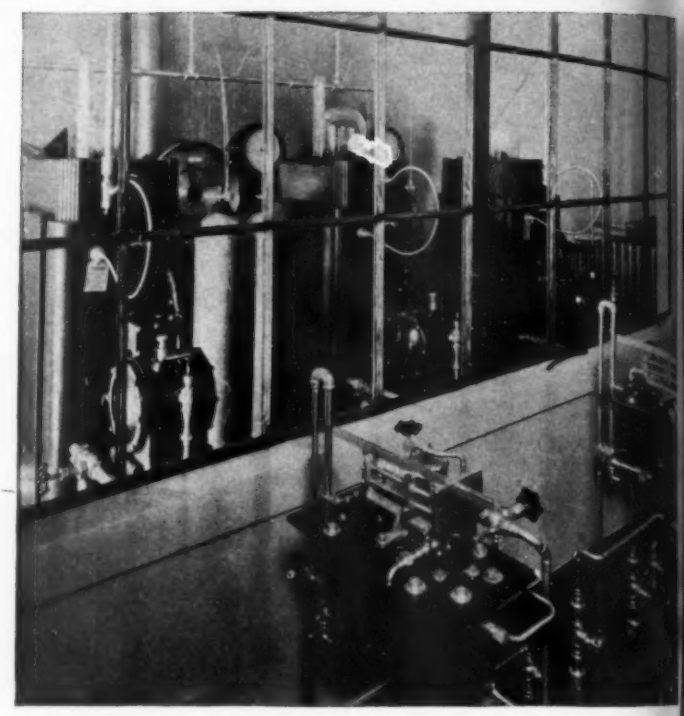

*"Taste and Odor Control by Reservoir Chlorine Blanket" by Gordon L. O'Brien, Designing Engineer, Bureau of Water Supply, Baltimore, Md. Water Works Engineering, Vol. 96 No. 18. A reprint of this article is yours for the asking.

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